

*H. L. Hager*

# SKY DIAGRAMS

1945



UNITED STATES NAVAL OBSERVATORY

WASHINGTON

D. C.



DE 1248

# SKY DIAGRAMS

1945

ISSUED BY THE NAUTICAL ALMANAC OFFICE  
UNITED STATES NAVAL OBSERVATORY  
UNDER THE AUTHORITY OF THE  
SECRETARY OF THE NAVY



THE LIBRARY  
S.D.A. Theological Seminary  
Takoma Park  
Washington 12, D.C.

UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1944

For sale by the Superintendent of Documents, U. S. Government Printing Office  
Washington 25, D. C. - Price 15 cents

19037



LIBRARY of  
Seventh day Adventist  
THEOLOGICAL SEMINARY  
TAKOMA PARK WASHINGTON, D.C.

From the Library of  
GRACE EDITH AMADON

1872 — 1945

PRESENTED IN RECOGNITION OF HER DEVOTION  
TO BIBLICAL STUDY AND RESEARCH  
BY HER NEPHEWS

Harry, Edwin, Walter, and William Gage



# U. S. NAVAL OBSERVATORY

Commodore J. F. HELLWEG, U. S. N., Retired, Superintendent

## ASTRONOMICAL COUNCIL

|                                                      |                          |
|------------------------------------------------------|--------------------------|
| Commodore J. F. HELLWEG, U. S. N., Retired . . . . . | Superintendent           |
| Captain V. K. COMAN, U. S. N., Retired . . . . .     | Assistant Superintendent |
| W. J. ECKERT . . . . .                               | Head Astronomer          |
| H. R. MORGAN . . . . .                               | Principal Astronomer     |
| H. E. BURTON . . . . .                               | Principal Astronomer     |
| C. B. WATTS . . . . .                                | Principal Astronomer     |
| PAUL SOLLENBERGER . . . . .                          | Principal Astronomer     |
| G. M. CLEMENCE . . . . .                             | Principal Astronomer     |

## NAUTICAL ALMANAC OFFICE

W. J. ECKERT, Director

|                                                    |                      |
|----------------------------------------------------|----------------------|
| G. M. CLEMENCE, Assistant Director . . . . .       | Principal Astronomer |
| PAUL HERGET . . . . .                              | Senior Astronomer    |
| ISABEL M. LEWIS . . . . .                          | Astronomer           |
| GLEN H. DRAPER . . . . .                           | Astronomer           |
| RALPH F. HAUPT . . . . .                           | Astronomer           |
| CHARLOTTE KRAMPE . . . . .                         | Associate Astronomer |
| JULES A. LARRIVEE . . . . .                        | Associate Astronomer |
| JACK BELZER . . . . .                              | Assistant Astronomer |
| BLANCHE R. WHITE . . . . .                         | Assistant Astronomer |
| RAYMOND H. WILSON, Jr. <sup>1</sup> . . . . .      | Junior Astronomer    |
| TECLA COMBARIATI SMITH . . . . .                   | Junior Astronomer    |
| HANS G. HERTZ . . . . .                            | Junior Astronomer    |
| GEORGE R. SCHAEFER . . . . .                       | Junior Astronomer    |
| NETTIE ROTUNNO . . . . .                           | Assistant Operator   |
| MARTHA P. HASENSTAB . . . . .                      | Assistant Operator   |
| THERESA E. COONEY, S1c, U. S. N. R. (W.) . . . . . | Assistant Operator   |
| LILLIAN E. STRONG . . . . .                        | Junior Operator      |
| BARBARA D. SCOTT . . . . .                         | Junior Operator      |

<sup>1</sup> Absent in military service.

## PIECEWORK COMPUTERS

ELSIE V. WILLIS                      LILLIAN FEINSTEIN  
MARY H. MIKESELL

September 1944.

## PREFACE

In 1943 it occurred to the Director of the Nautical Almanac Office that navigators might welcome a means of selecting celestial objects for navigation and of identifying them in the sky more readily than was possible by existing methods. Star finders in common use have serious scale distortion; they require setting; and do not show the Moon and planets. It was thought that a series of circular diagrams, showing the principal navigational objects on an azimuthal equidistant projection with center at the zenith, for different hours of the night and for different latitudes, might be useful. Accordingly, sets of experimental *Sky Diagrams* were prepared and circulated to naval activities during 1944. With the second set of diagrams there was circulated a questionnaire designed to ascertain their practical value. To date (September 1, 1944), replies have been received from 689 ships, of which all but 20 are favorable. Replies from aircraft employing celestial navigation are equally favorable. In consequence, the first regular edition of *Sky Diagrams* is being issued for general distribution. In addition, it is intended to incorporate the diagrams into the *American Air Almanac* beginning with the volumes for 1946.

J. F. HELLWEG,  
Commodore, U. S. Navy, Retired,  
Superintendent, Naval Observatory.

WASHINGTON, September 1944.



These diagrams show the appearance of the sky in various latitudes at different times of the night. They are useful in selecting the most suitable stars and planets for navigation on a given flight and for identifying prominent objects at the time of observation.

The *Sky Diagrams* have four advantages over ordinary star charts and star finders:

1. They are ready for immediate use without settings or tables of any kind.
2. Planets and the Moon are shown as well as the stars.
3. True altitudes and bearings are shown on the diagrams without distortion.
4. The appearance of the sky for different latitudes and times is shown at one opening so the appearance for intermediate latitudes and times is easily visualized.

There is a series of diagrams for each month showing the sky for six different latitudes at 2-hour intervals during the night. Those for the evening hours appear on two facing pages and those for the morning on the two following. The diagrams for a given latitude are arranged in a row and show the changes in the sky during the night.

In each diagram the circular outline represents the horizon and the cross at the center the zenith. Altitudes are measured radially with a linear scale; i. e., an object one third of the way from the edge to the center has an altitude of  $30^\circ$ . The small circles on the diagrams are at altitudes  $30^\circ$  and  $60^\circ$ . Azimuths are measured as on the navigation chart with north at the top and east at the right. On various parts of the diagram are small curved arrows indicating the diurnal motion in that area; the length of the arrow shows the motion in one hour.

The objects shown on the diagrams are the 22 navigational stars contained in the *Astronomical Navigation Tables* (H. O. 218), the four planets Venus, Mars, Jupiter, and Saturn, the Moon, and the north and south celestial poles. The position of a star or a planet is indicated by the symbol which also shows its brightness, the magnitude scale being the same as that of the daily diagrams in the *American Air Almanac*. Near each star symbol is the number in the H. O. 218 list and near each planet symbol is its initial. The north and south celestial poles are identified by the initials NP and SP. The position of the Moon is shown by a circle with the day of the month on which it occupies that position.

The positions of the stars and planets in each diagram are indicated for the 15th of the month and will usually serve for the entire month. If it is desired to allow for the motion of the stars during the month it is necessary only to remember that a given configuration will occur at the beginning of the month 1 hour later than the time indicated, and at the end of the month 1 hour earlier. In those months during which Venus or Mars moves considerably with respect to the stars the positions for the first and last of the month are shown; the position toward the west is for the first of the month.

The Moon moves so rapidly with respect to the stars that its position at a given time of the night varies rapidly from night to night, and it is necessary to show on each diagram a succession of positions for various days of the month. Three or four such positions are indicated and those for the intermediate dates may be interpolated be-

tween those given. Since the Moon moves completely around the sky in slightly less than a month or a little over  $13^\circ$  in a day, it will appear on a given diagram for about half of each month. The position on the diagram for each successive night is always to the eastward, and when it disappears off the eastern edge of the diagram it will reappear on the western edge about 2 weeks later.

The diagrams are particularly useful in selecting the most suitable objects for a given flight.

*Example 1.* Select the best available objects to give a fix at  $23^h$  LCT on Feb. 10, 1945, during a flight on a true course of  $210^\circ$  in latitude  $30^\circ$  N.

The required diagram, which is the fourth one in the bottom row on page 10, is reproduced here with the course of  $210^\circ$  marked on it.

Examination of the diagram shows immediately that the best objects, giving Sumner lines perpendicular to the track and parallel to it are 20 and 10, Sirius and Capella. Sirius is in altitude about  $35^\circ$ , true bearing about  $210^\circ$ ; Capella is in altitude about  $45^\circ$ , true bearing about  $300^\circ$ . If desired the altitudes and bearings may be found more accurately with dividers and the scale diagrams.

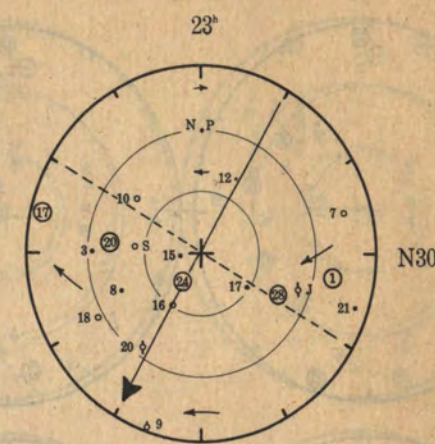
The *Sky Diagrams* used in conjunction with the star chart and the daily diagrams in the *American Air Almanac* are extremely effective in star identification, the star chart and the daily diagrams being used for detailed verification of the identification made with the *Sky Diagrams*.

*Example 2.* On June 1, 1945, at the end of evening twilight, in latitude  $10^\circ$  S., it is desired to know what objects will be visible. The *Air Almanac* gives the time of sunset as  $17^h 45^m$ , the duration of twilight as  $23^m$  and hence the time of ending of evening twilight is  $18^h 08^m$ . Since a given configuration will occur at the beginning of a month one hour later, the diagram to be used is the one for June 1945,  $10^\circ$  S.,  $17^h$ , which is the first diagram in the middle row on page 27. The azimuths and altitudes of the various objects visible at that time can now be read from the diagram.

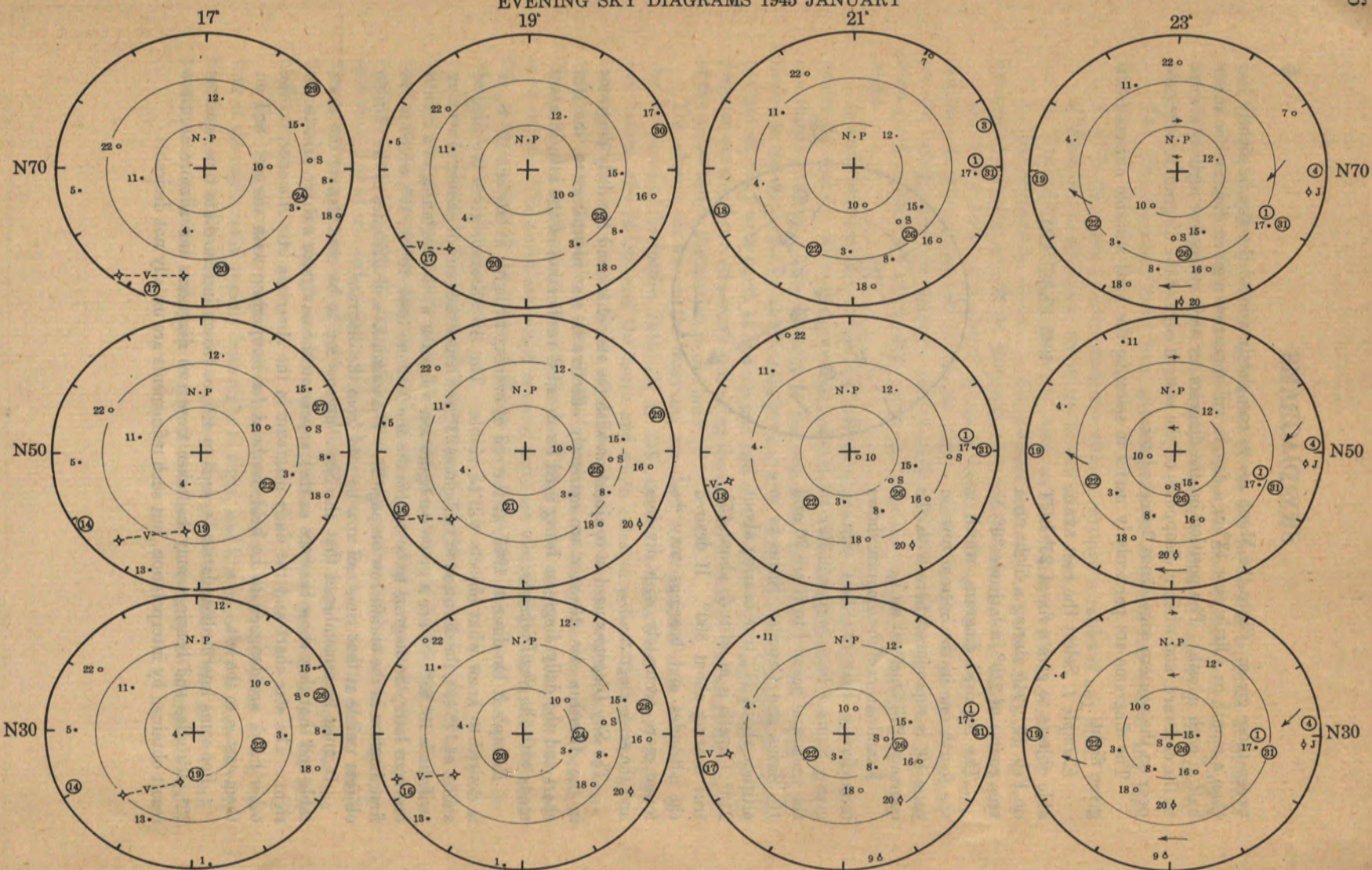
It must be remembered that the *Sky Diagrams* are to be used flat on the chart table and that they show bearings as they appear on the navigator's chart, east to the right. The star chart and the daily diagrams in the *American Air Almanac*, on the other hand, are designed to be held overhead for comparison with the sky, and on them east is to the left.

For some intermediate latitude, such as  $40^\circ$ , or for an intermediate time, such as  $22^h$ , altitudes and bearings may be taken from two diagrams and a more accurate result obtained by interpolation, but such refinements are usually not desirable.

1945 FEBRUARY







STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Jan. 1  
② " " 2

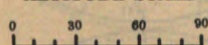
POLES

N·P North, S·P South

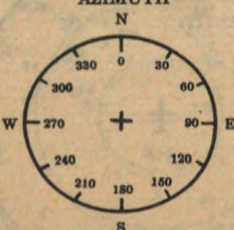
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
♦ A ♄ ♀ ☽ ☿

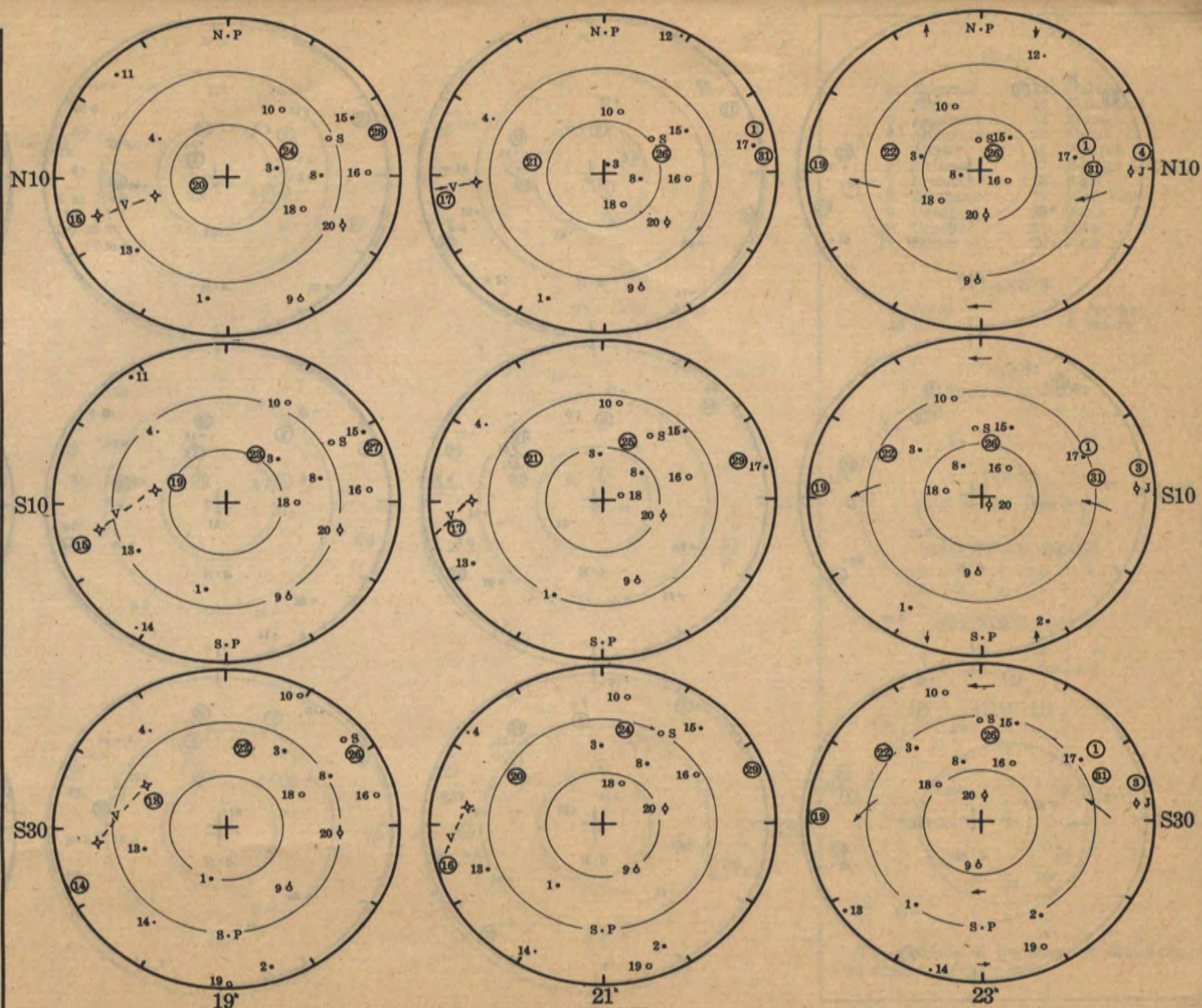
ALTITUDE SCALE



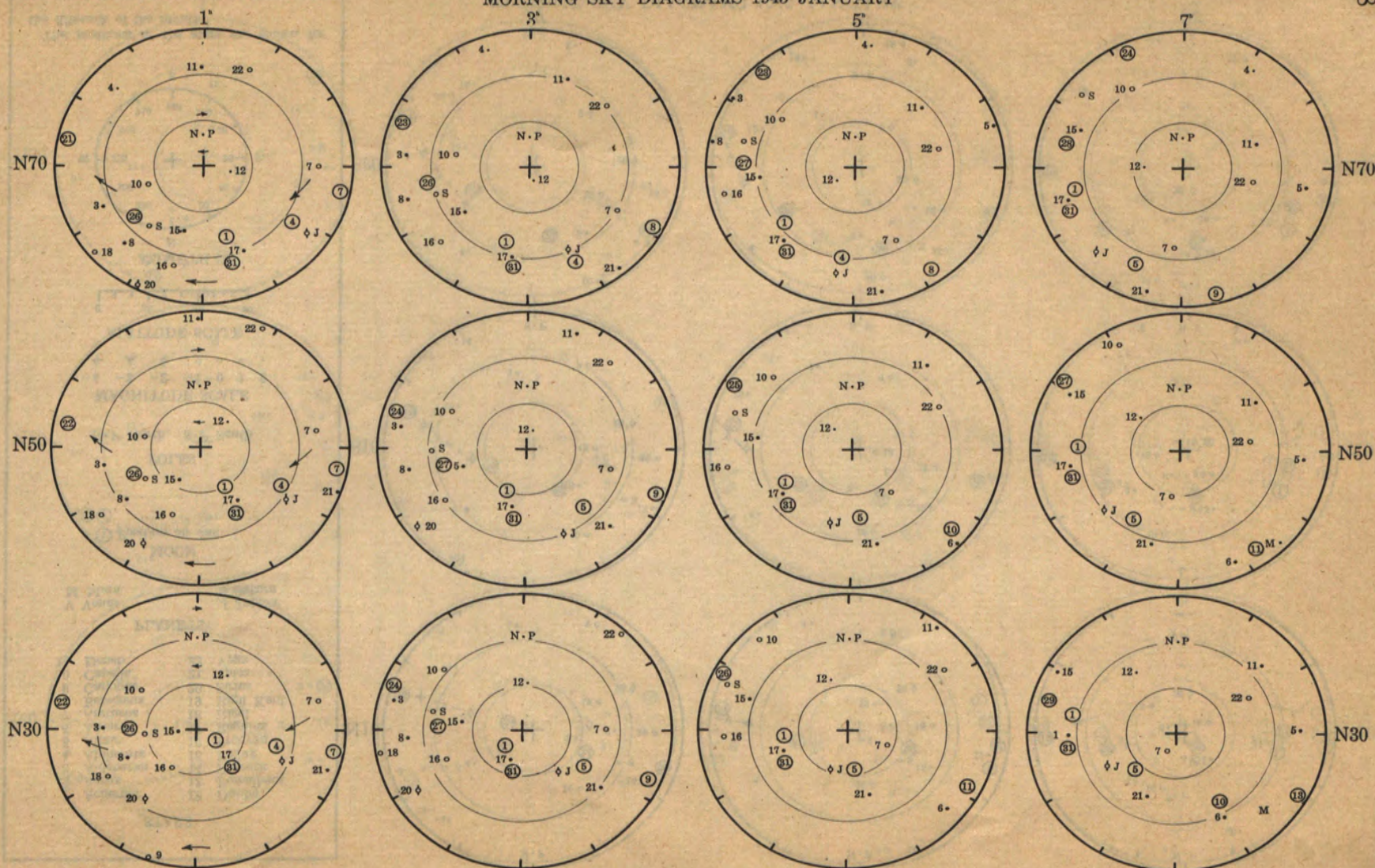
AZIMUTH



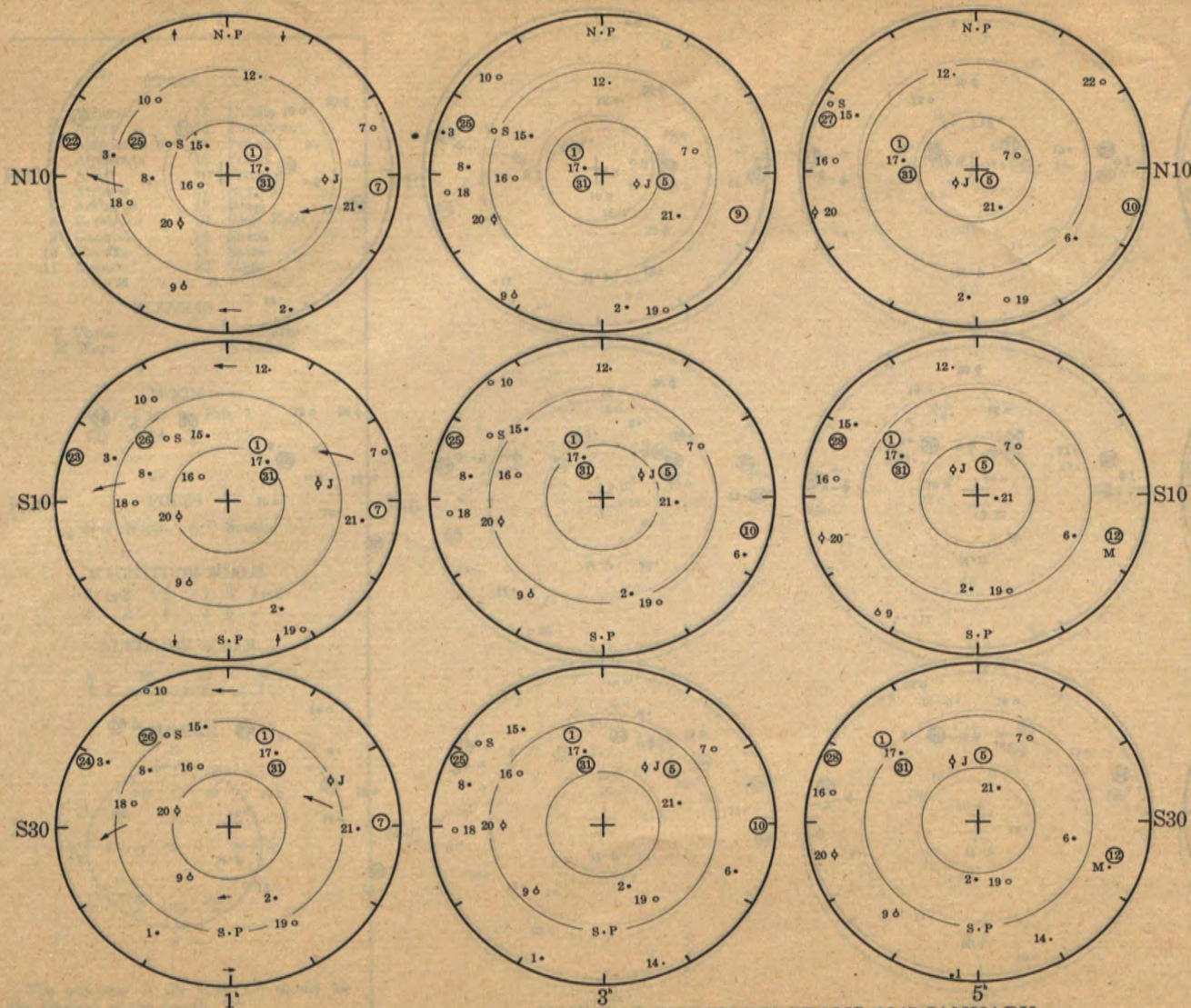
The positions of the stars are shown for the fifteenth of the month.







609403 O-44-2



STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Jan. 1  
② " " " 2

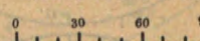
POLES

N-P North, S-P South

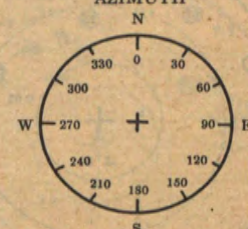
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A φ δ ○ . .

ALTITUDE SCALE

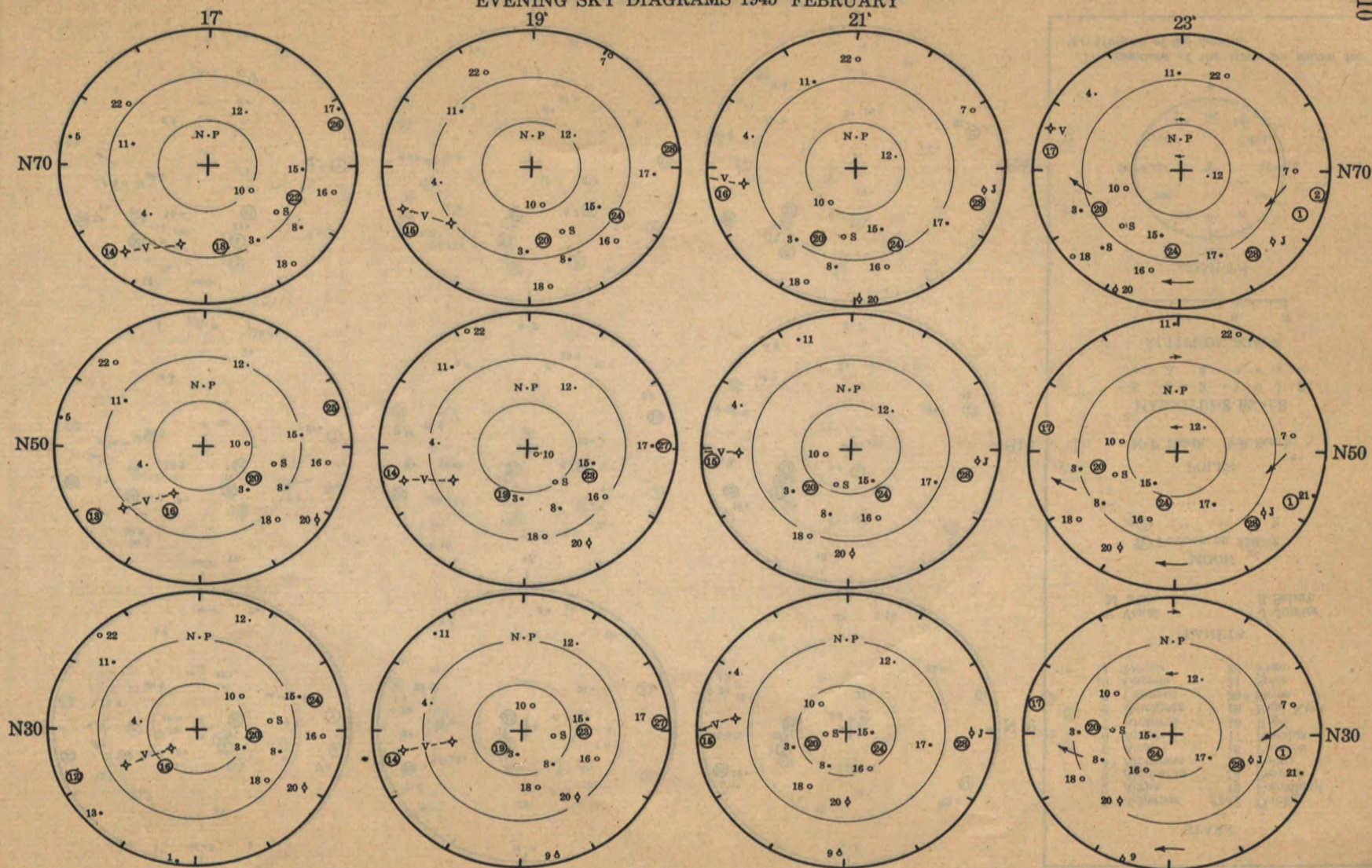


AZIMUTH



The positions of the stars are shown for the fifteenth of the month.





STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Feb. 1  
② " " " 2

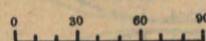
POLES

N-P North, S-P South

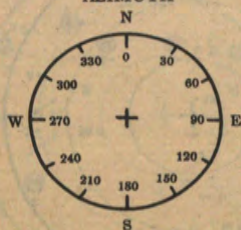
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A  $\diamond$   $\circ$   $\bullet$   $\cdot$

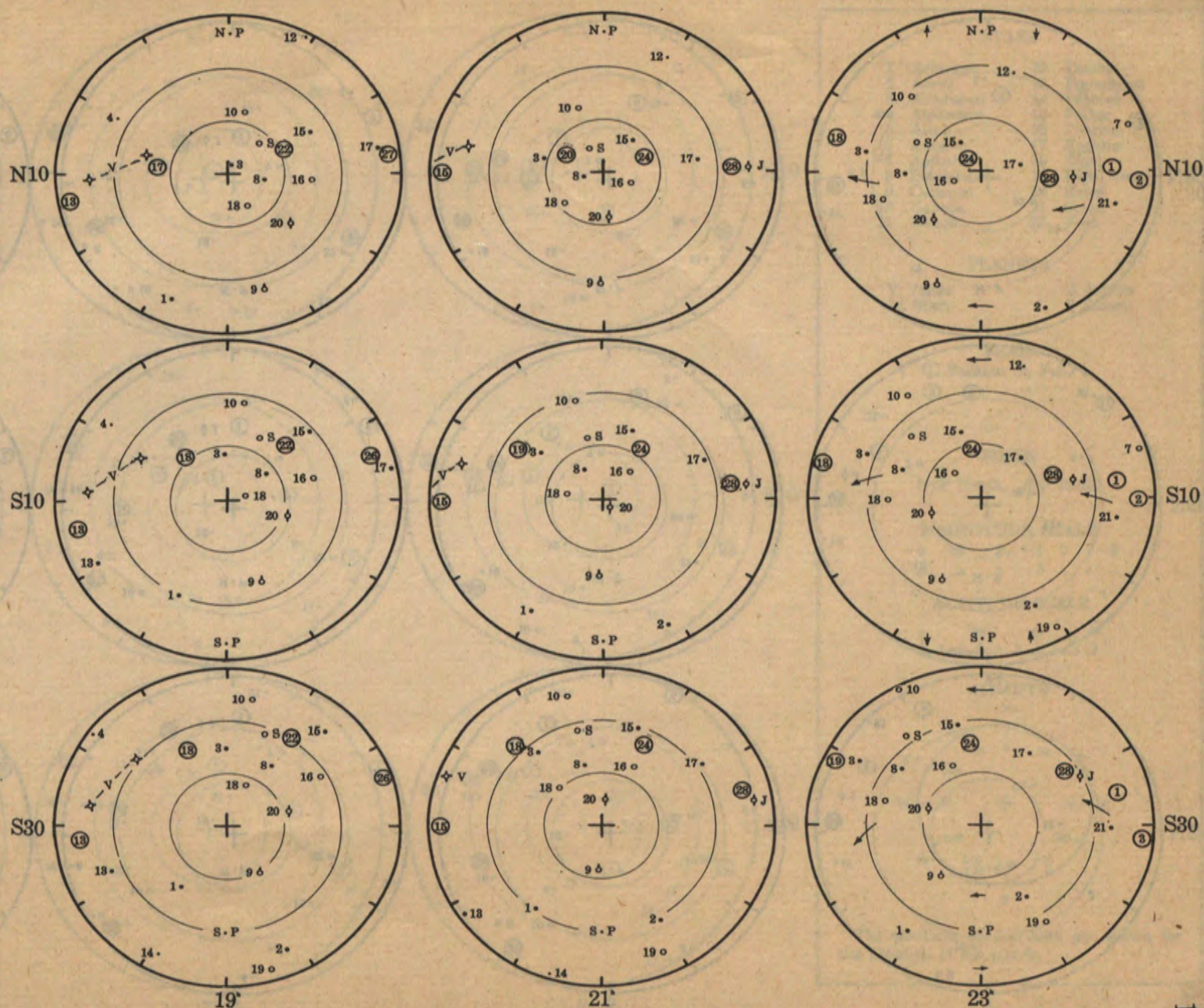
ALTITUDE SCALE



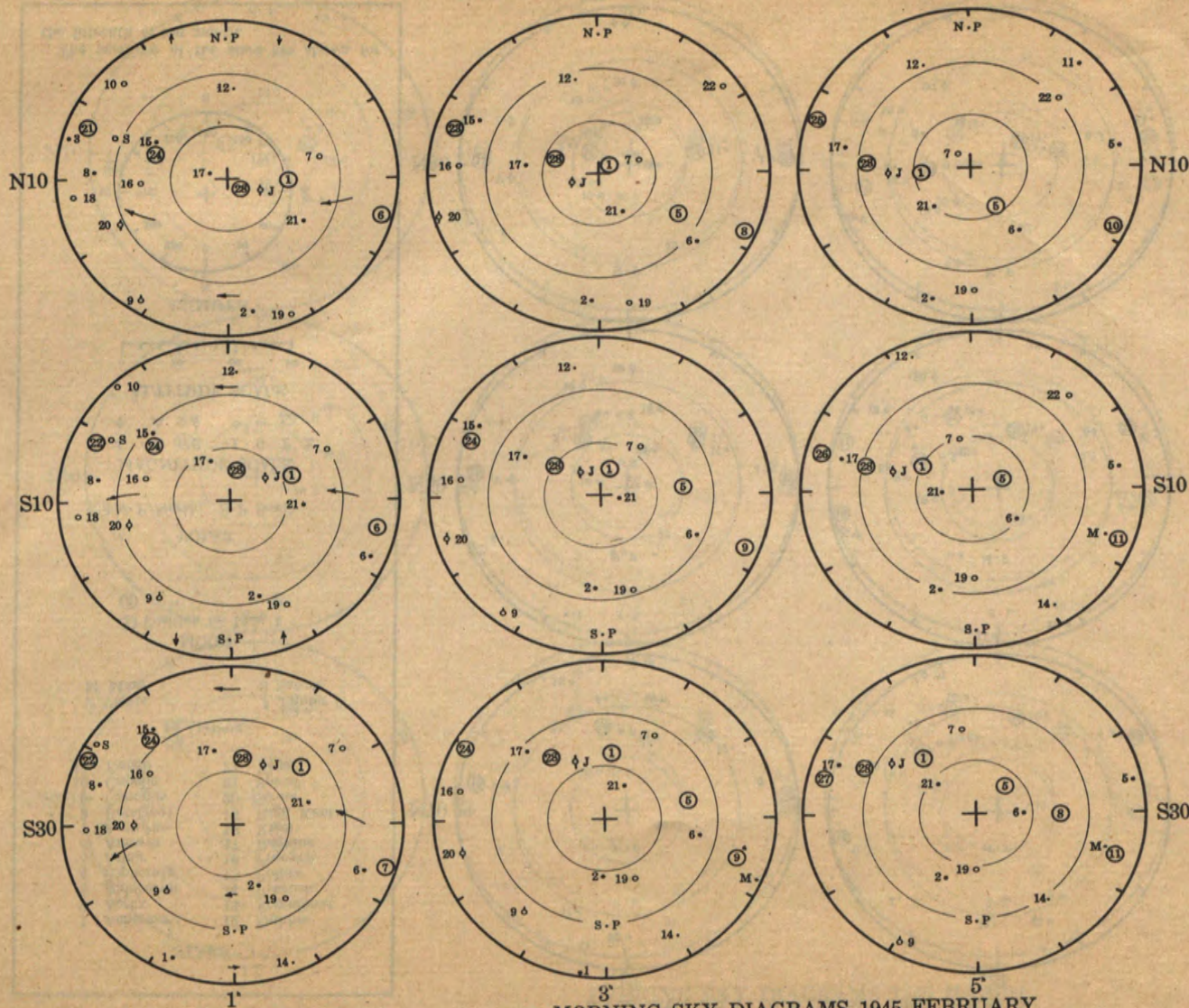
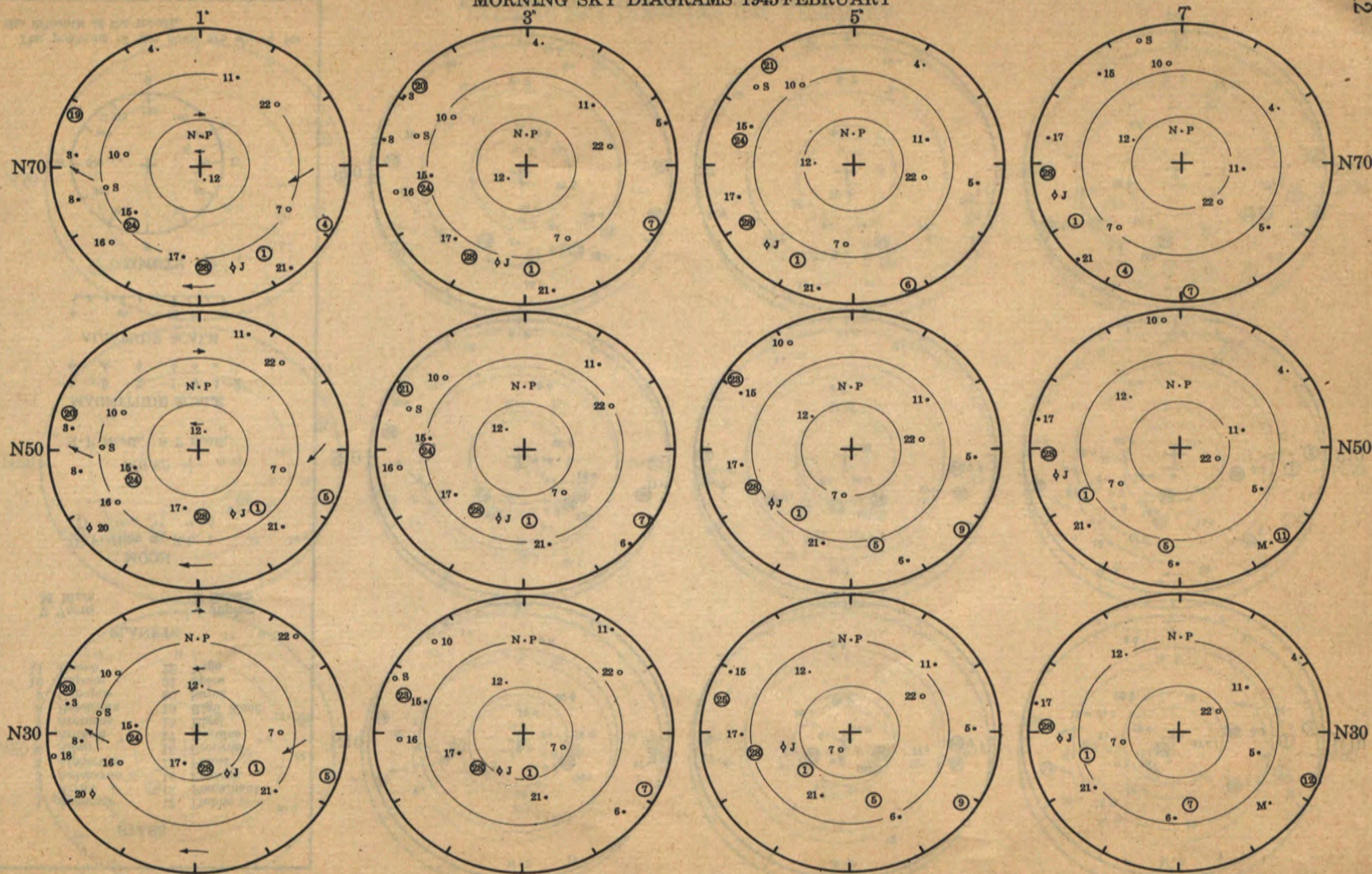
AZIMUTH



The positions of the stars are shown for the fifteenth of the month.







STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

① Position on Feb. 1  
② " " " 2

POLES

N.P North, S.P South

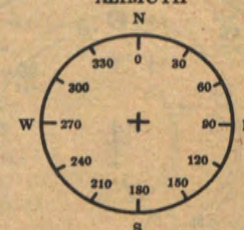
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A + + + + +

ALTITUDE SCALE

0 30 60 90

AZIMUTH



The positions of the stars are shown for the fifteenth of the month.



# EVENING SKY DIAGRAMS 1945 MARCH

14

## STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

## PLANETS

V Venus J Jupiter  
M Mars S Saturn

## MOON

- ① Position on Mar. 1  
② " " " 2

## POLES

N.P North, S.P South

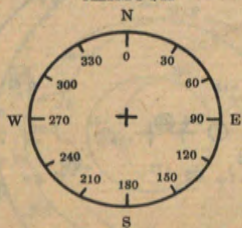
## MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A + + + + +

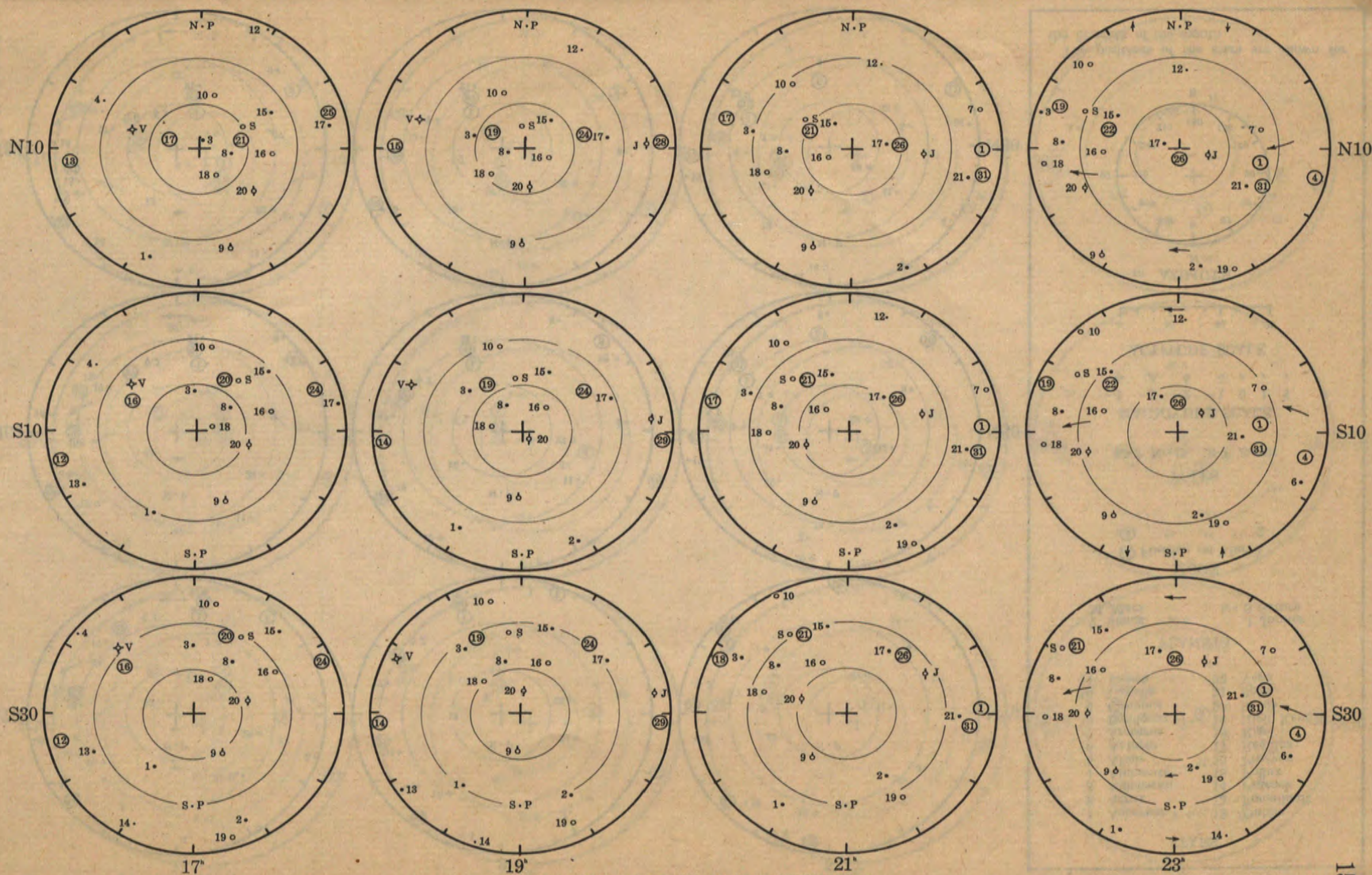
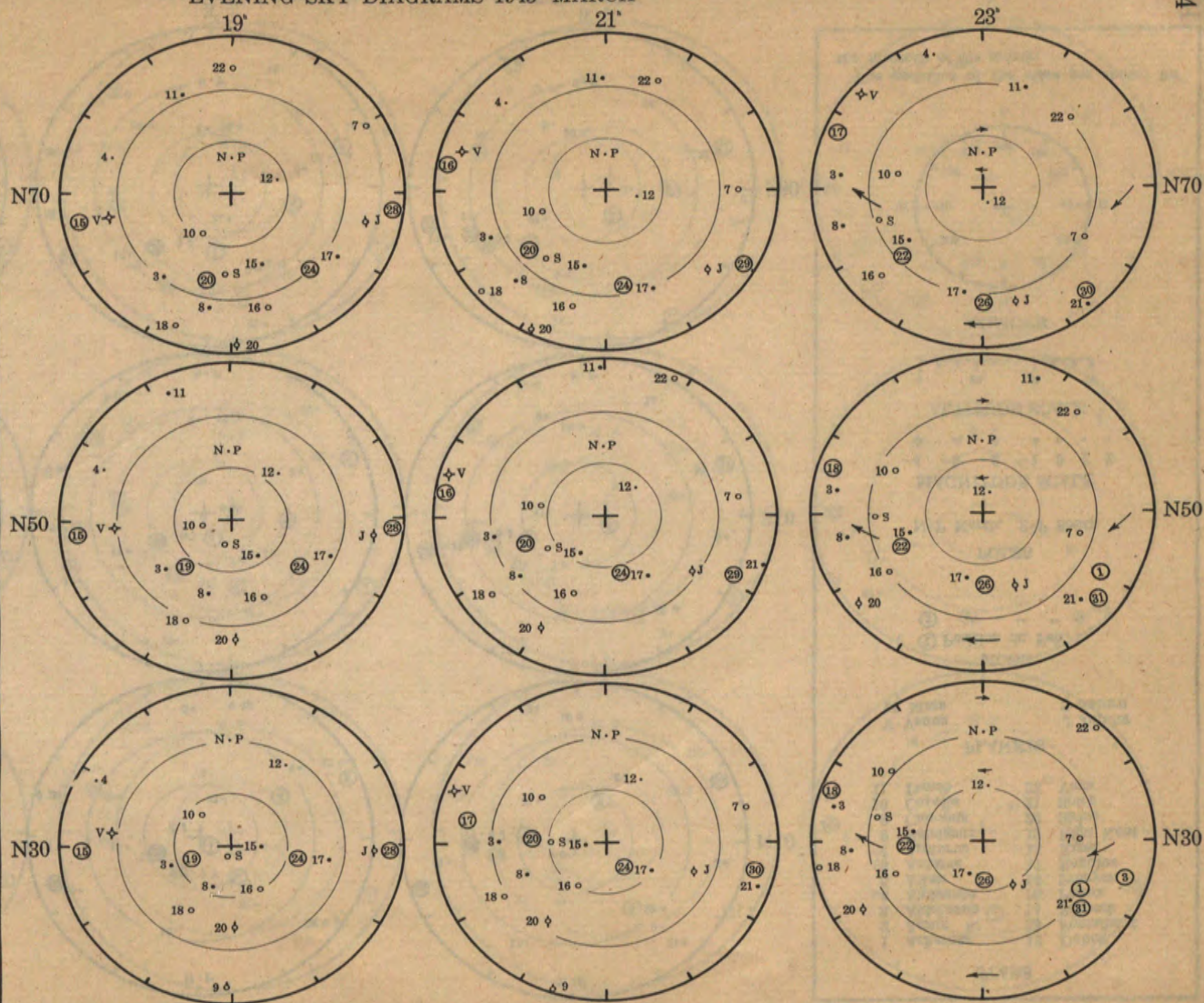
## ALTITUDE SCALE

0 30 60 90

## AZIMUTH



The positions of the stars are shown for the fifteenth of the month.

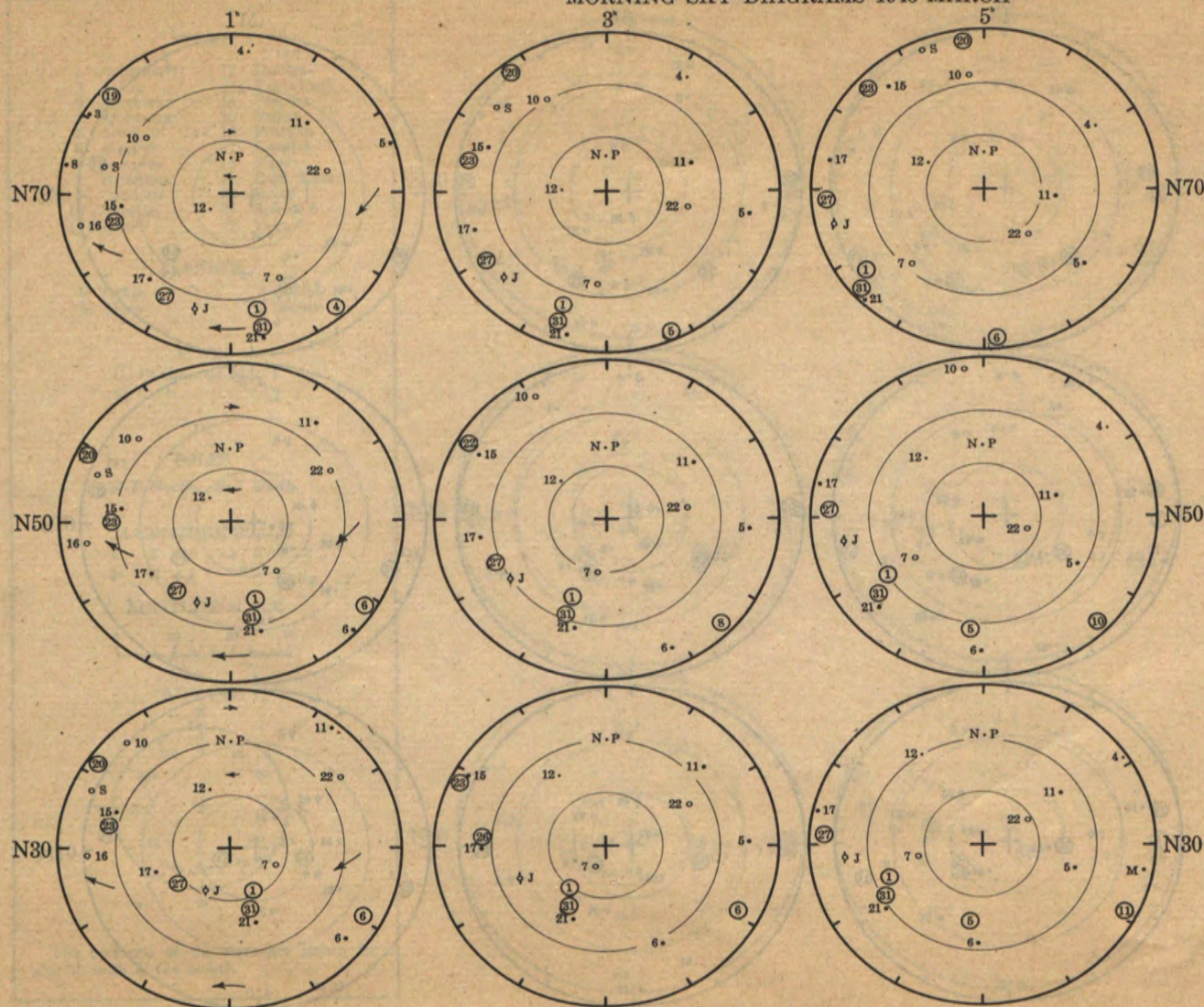


# EVENING SKY DIAGRAMS 1945 MARCH

15



# MORNING SKY DIAGRAMS 1945 MARCH



| STARS       |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

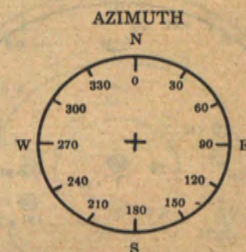
| PLANETS |           |
|---------|-----------|
| V Venus | J Jupiter |
| M Mars  | S Saturn  |

MOON  
 ① Position on Mar. 1  
 ② " " " 2

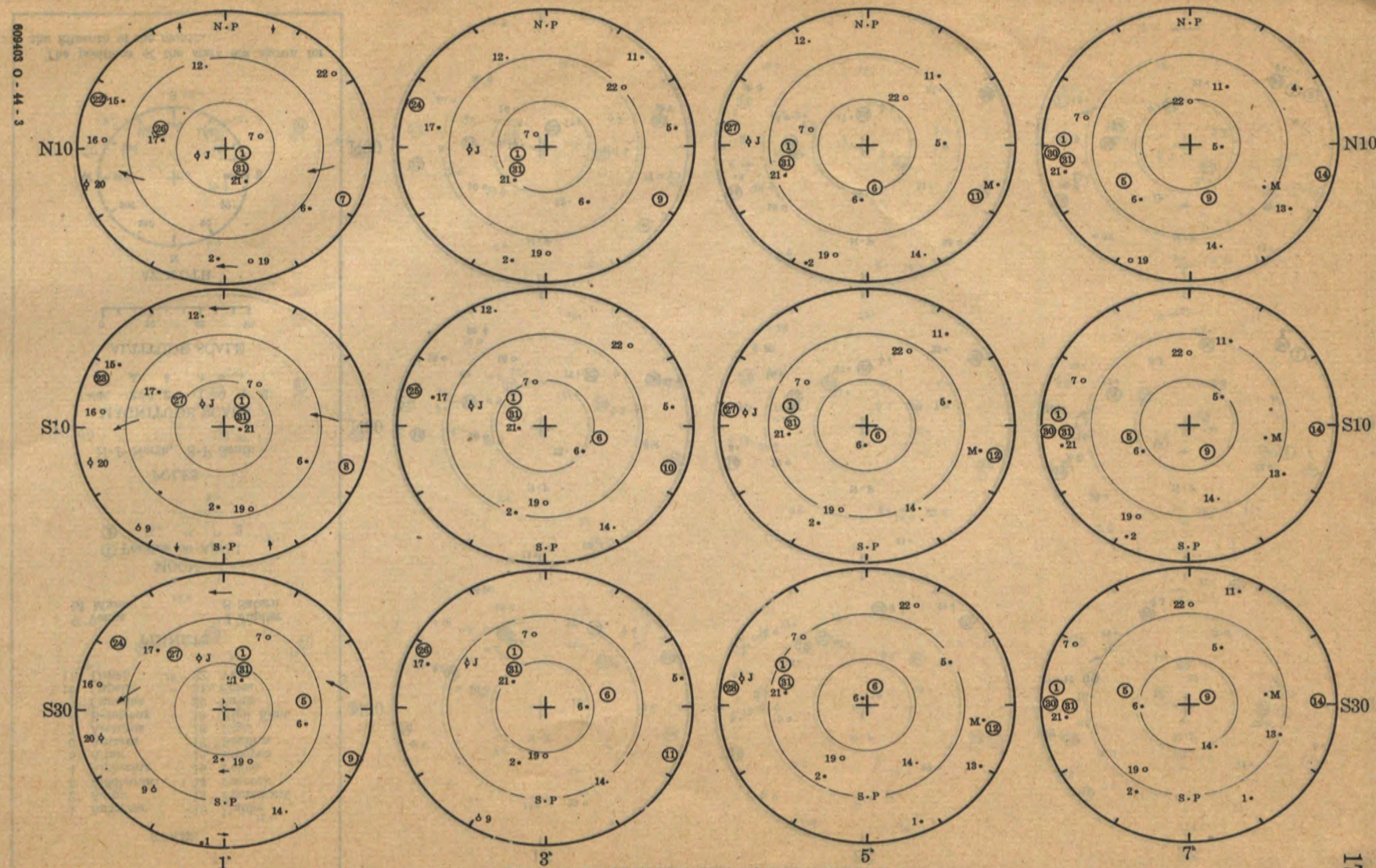
POLES  
 N.P. North, S.P. South

MAGNITUDE SCALE  
 -4 -3 -2 -1 0 1 2  
 ⬤ A ⬤ ⬤ ⬤ ⬤ ⬤

ALTITUDE SCALE  
 0 30 60 90



The positions of the stars are shown for the fifteenth of the month.



# MORNING SKY DIAGRAMS 1945 MARCH



STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

- V Venus      J Jupiter  
M Mars      S Saturn

MOON

- ① Position on Apr. 1  
② " " " 2

POLES

N.P. North, S.P. South

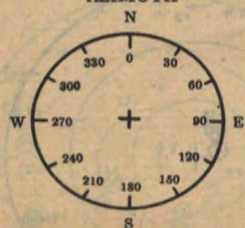
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A φ δ o . .

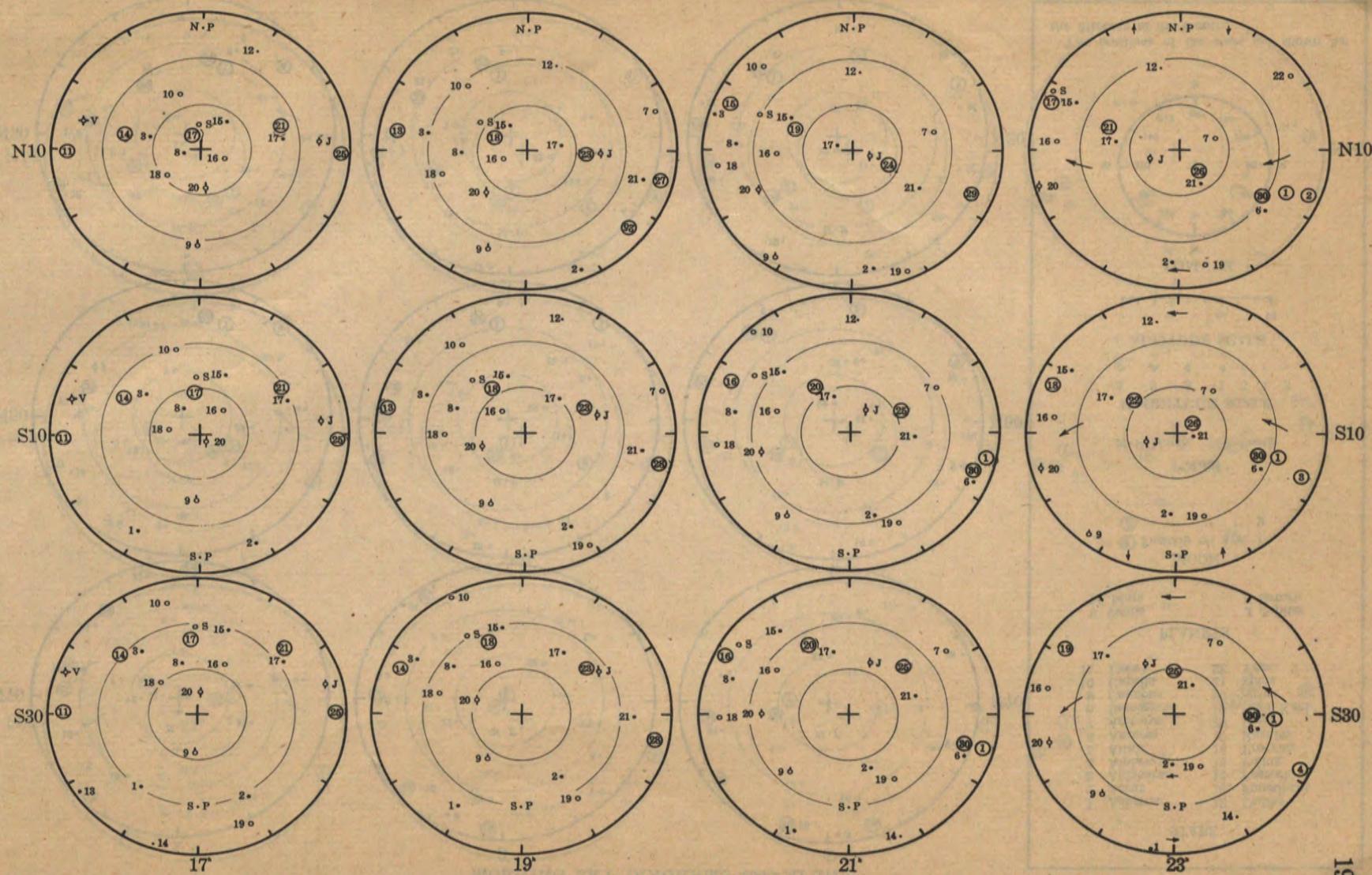
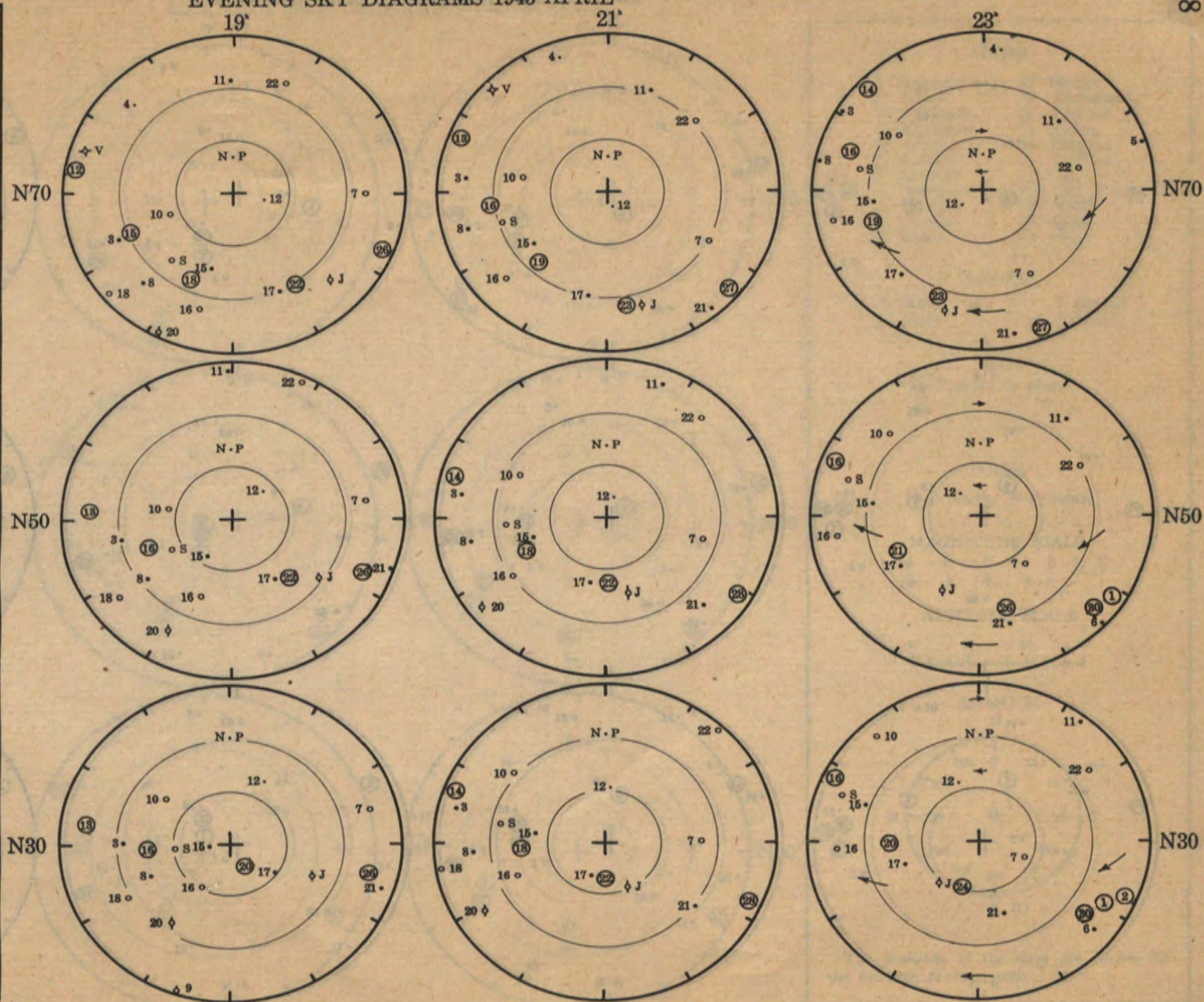
ALTITUDE SCALE



AZIMUTH

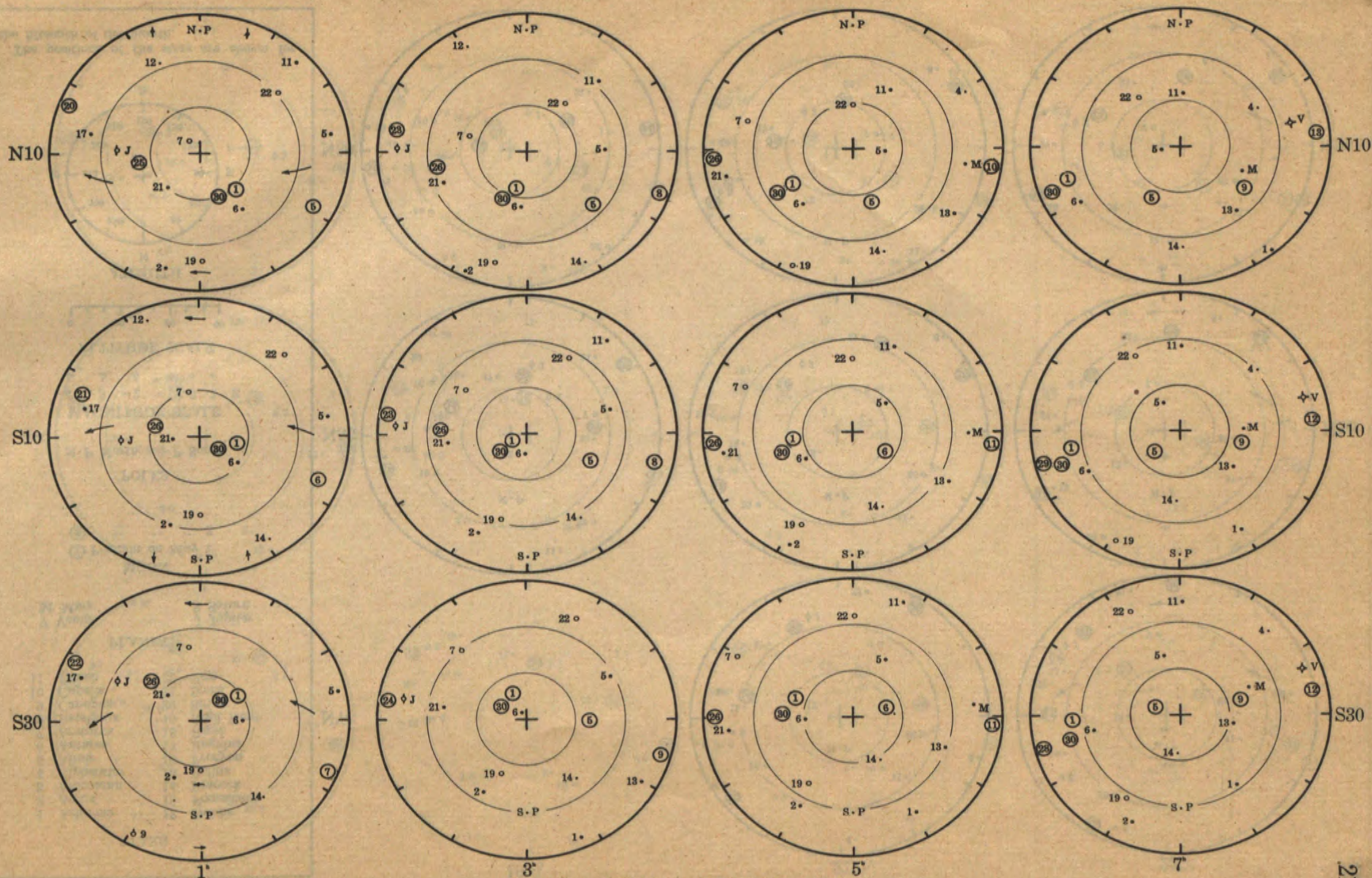
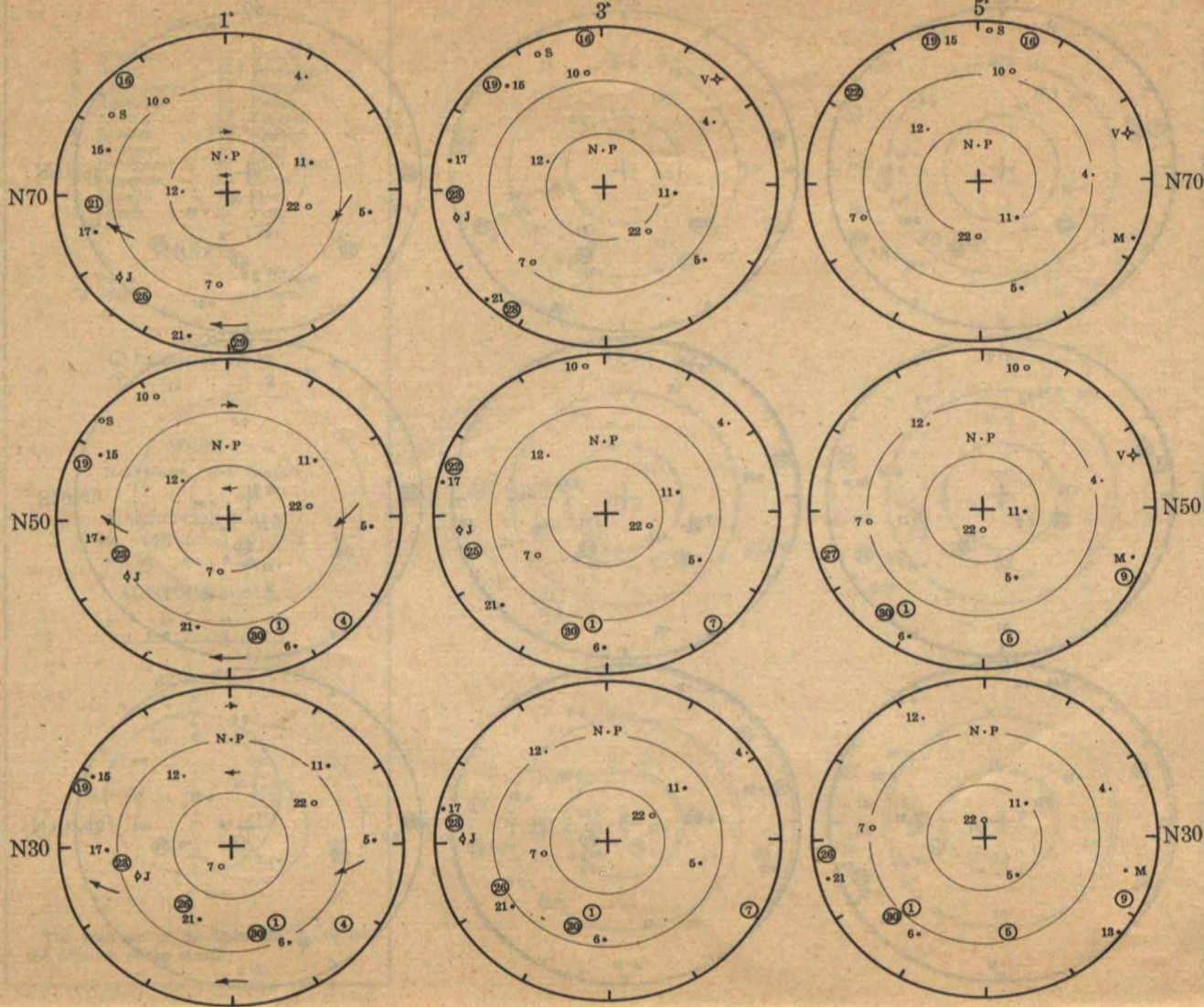


The positions of the stars are shown for the fifteenth of the month.





MORNING SKY DIAGRAMS 1945 APRIL





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on May 1  
② " " " 2

POLES

N.P North, S.P South

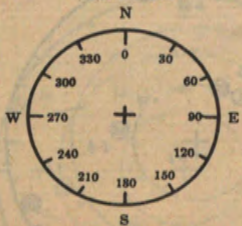
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A + + + + +

ALTITUDE SCALE



AZIMUTH



The positions of the stars are shown for the fifteenth of the month.

N70

N50

N30

N70

N50

N30

N10

S10

S30

N10

S10

S30

17

19

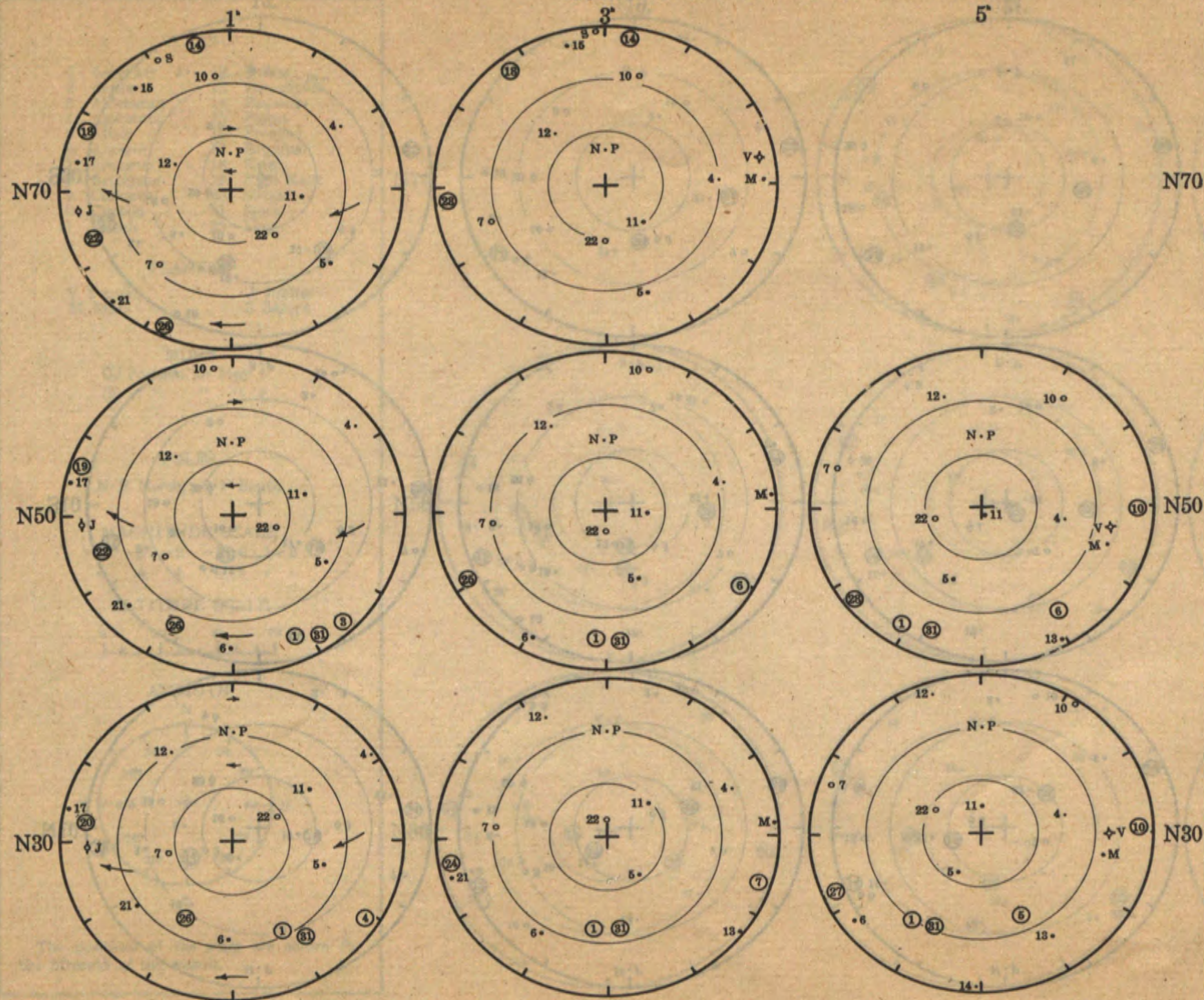
21

23

23



MORNING SKY DIAGRAMS 1945 MAY



**STARS**

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

**PLANETS**

V Venus                      J Jupiter  
M Mars                      S Saturn

**MOON**

① Position on May 1  
② " " " " 2

**POLES**

N·P North, S·P South

**MAGNITUDE SCALE**

-4 -3 -2 -1 0 1 2  
+ A + + + + +

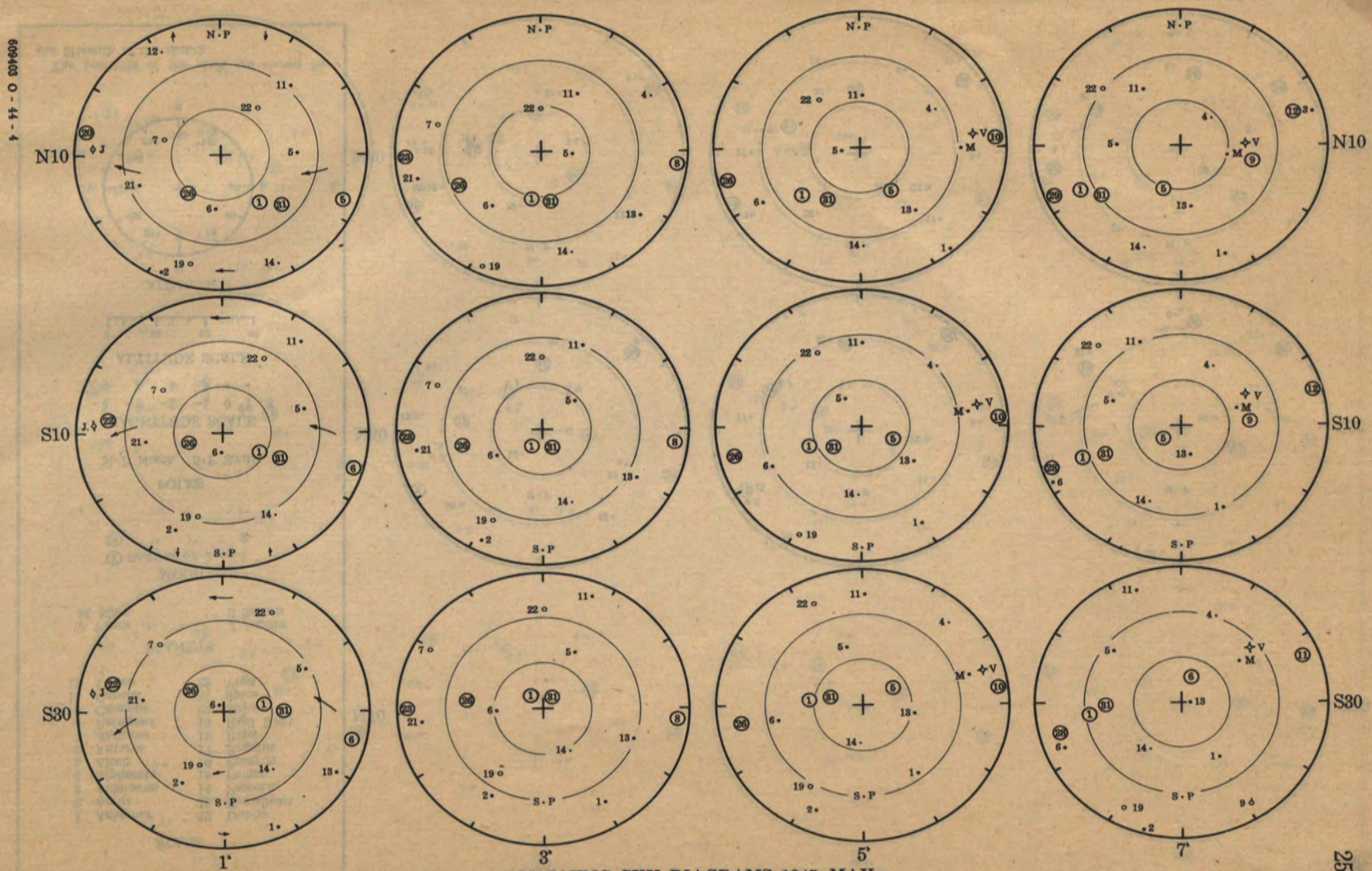
**ALTITUDE SCALE**

0 30 60 90

**AZIMUTH**

N  
330 0 30 60 90 120 150 180 210 240 270 300 330  
W + E  
S

The positions of the stars are shown for the fifteenth of the month.





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on June 1  
② " " " 2

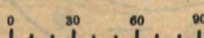
POLES

N.P North, S.P South

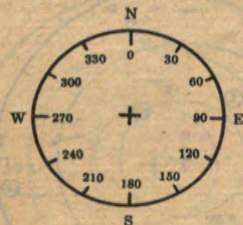
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A + + + + +

ALTITUDE SCALE



AZIMUTH



The positions of the stars are shown for the fifteenth of the month.

N70

N70

N50

N50

N30

N30

N10

N10

S10

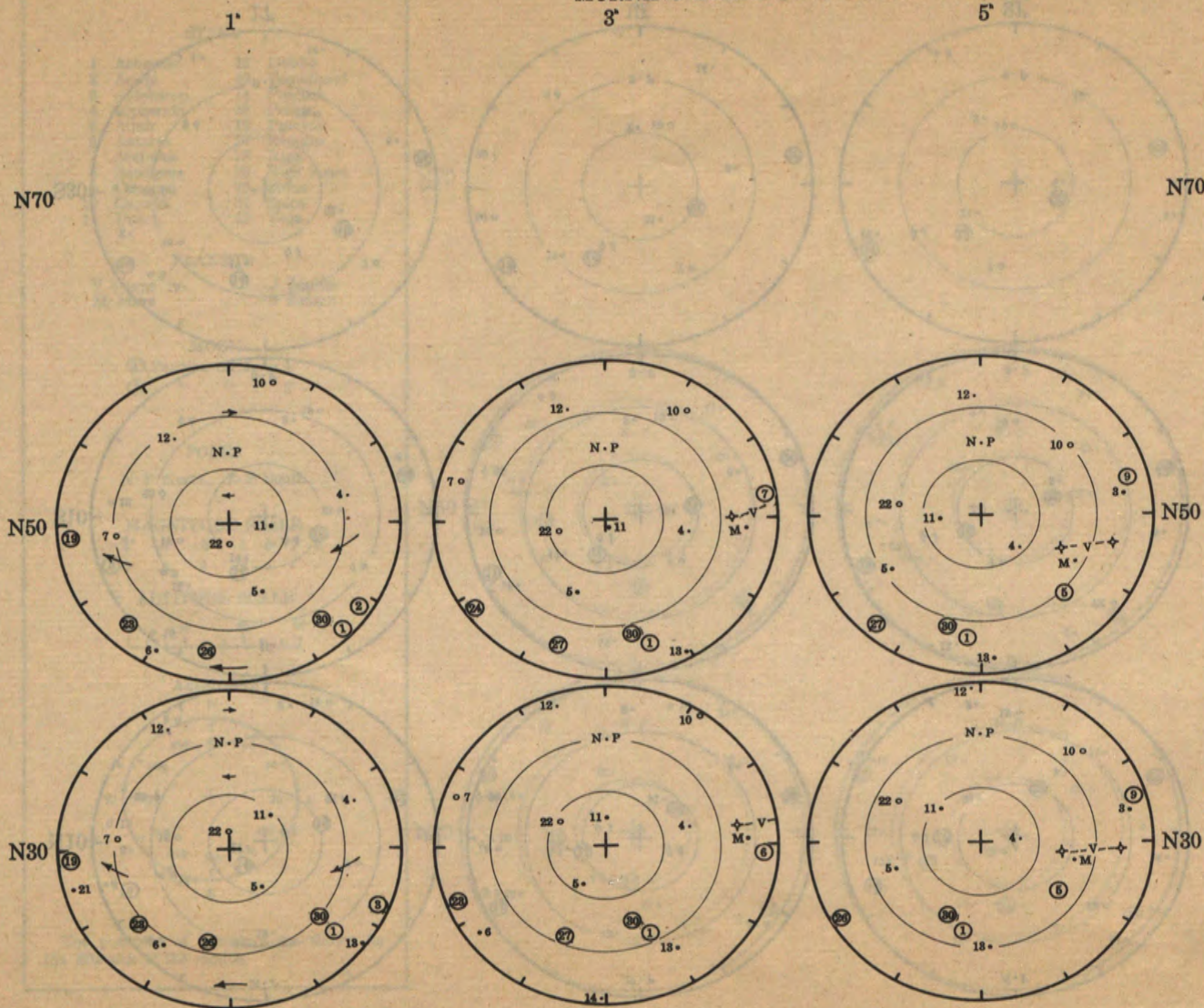
S10

S30

S30

17'





**STARS**

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

**PLANETS**

V Venus      J Jupiter  
M Mars      S Saturn

**MOON**

① Position on June 1  
② " " " 2

**POLES**

N-P North, S-P South

**MAGNITUDE SCALE**

-4 -3 -2 -1 0 1 2  
+ A φ ○ ○ ○

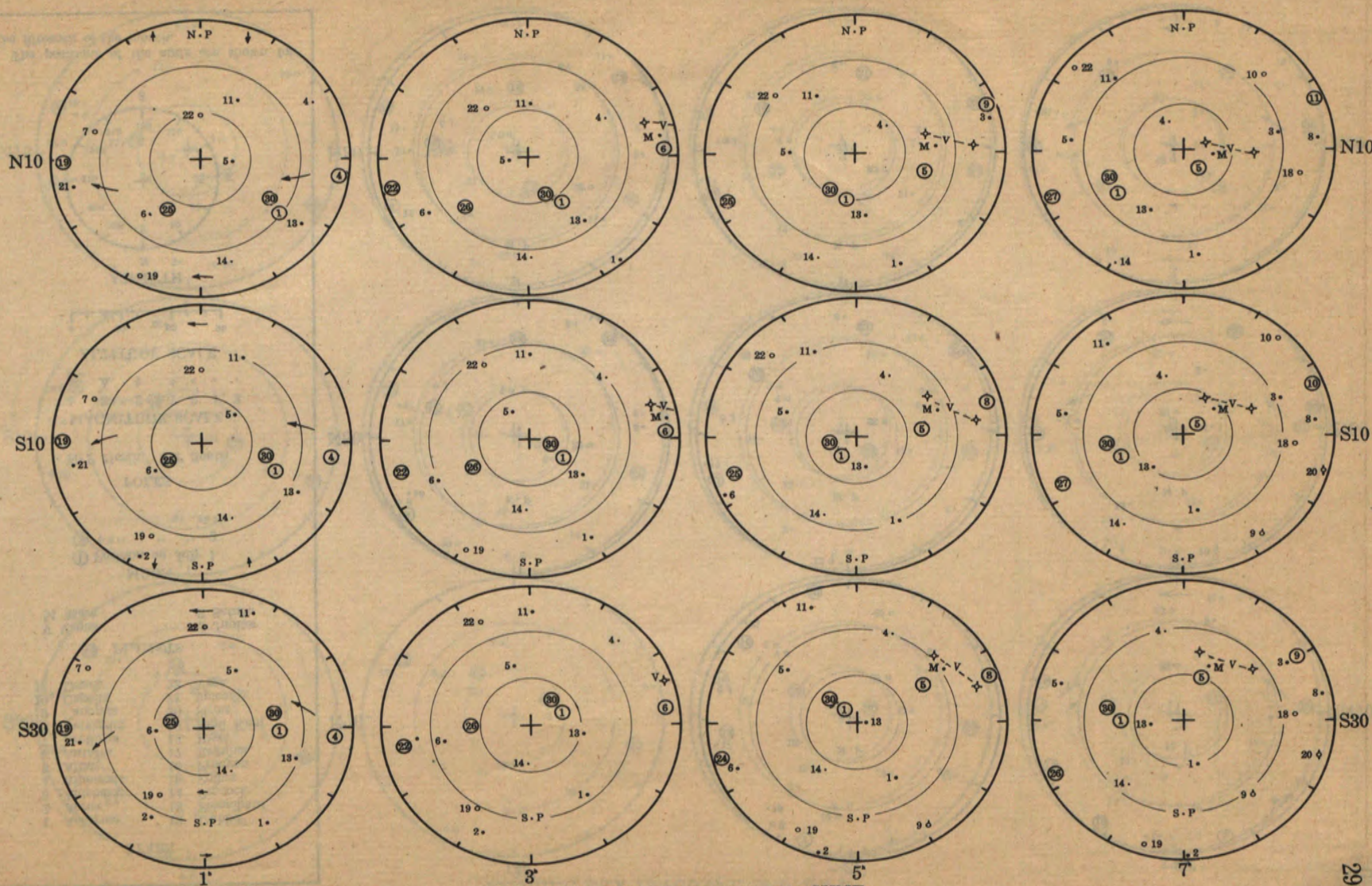
**ALTITUDE SCALE**

0 30 60 90

**AZIMUTH**

N  
330 0 30  
300 60  
W 270 90 E  
240 120  
210 150  
S 180

The positions of the stars are shown for the fifteenth of the month.





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on July 1  
② " " " 2

POLES

N·P North, S·P South

MAGNITUDE SCALE

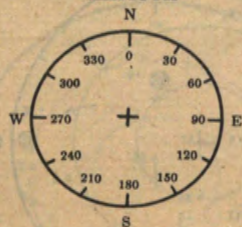
-4 -3 -2 -1 0 1 2

⬤ A ⬤ ⬤ ⬤ ⬤ ⬤

ALTITUDE SCALE

0 30 60 90

AZIMUTH



The positions of the stars are shown for the fifteenth of the month.

N70

N50

N30

21°

23°

N70

N50

N30

N10

S10

S30

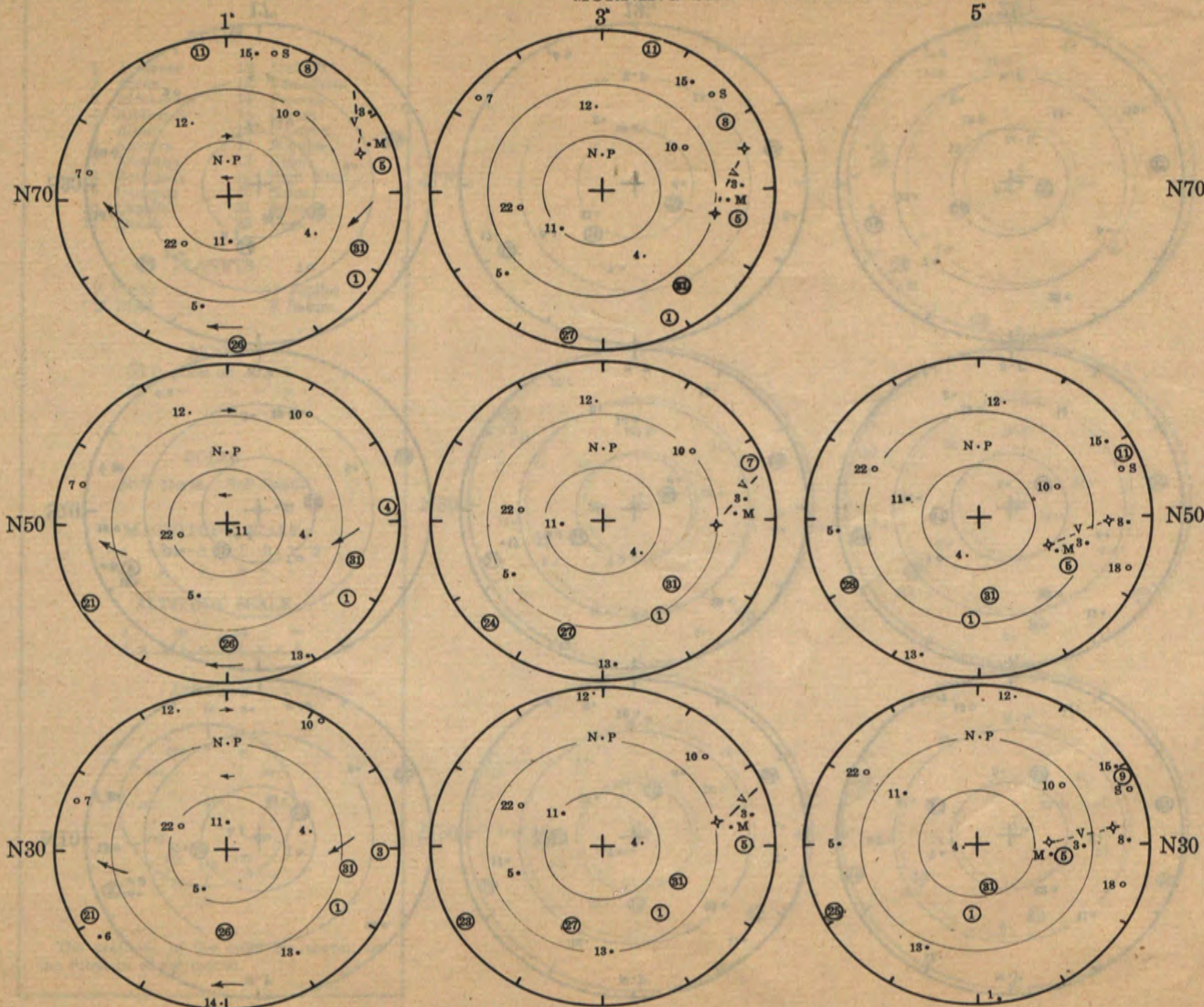
N10

S10

S30

17





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

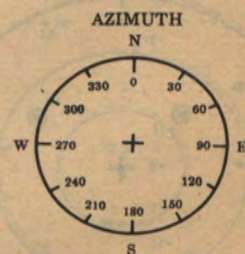
PLANETS  
 V Venus J Jupiter  
 M Mars S Saturn

MOON  
 ① Position on July 1  
 ② " " " 2

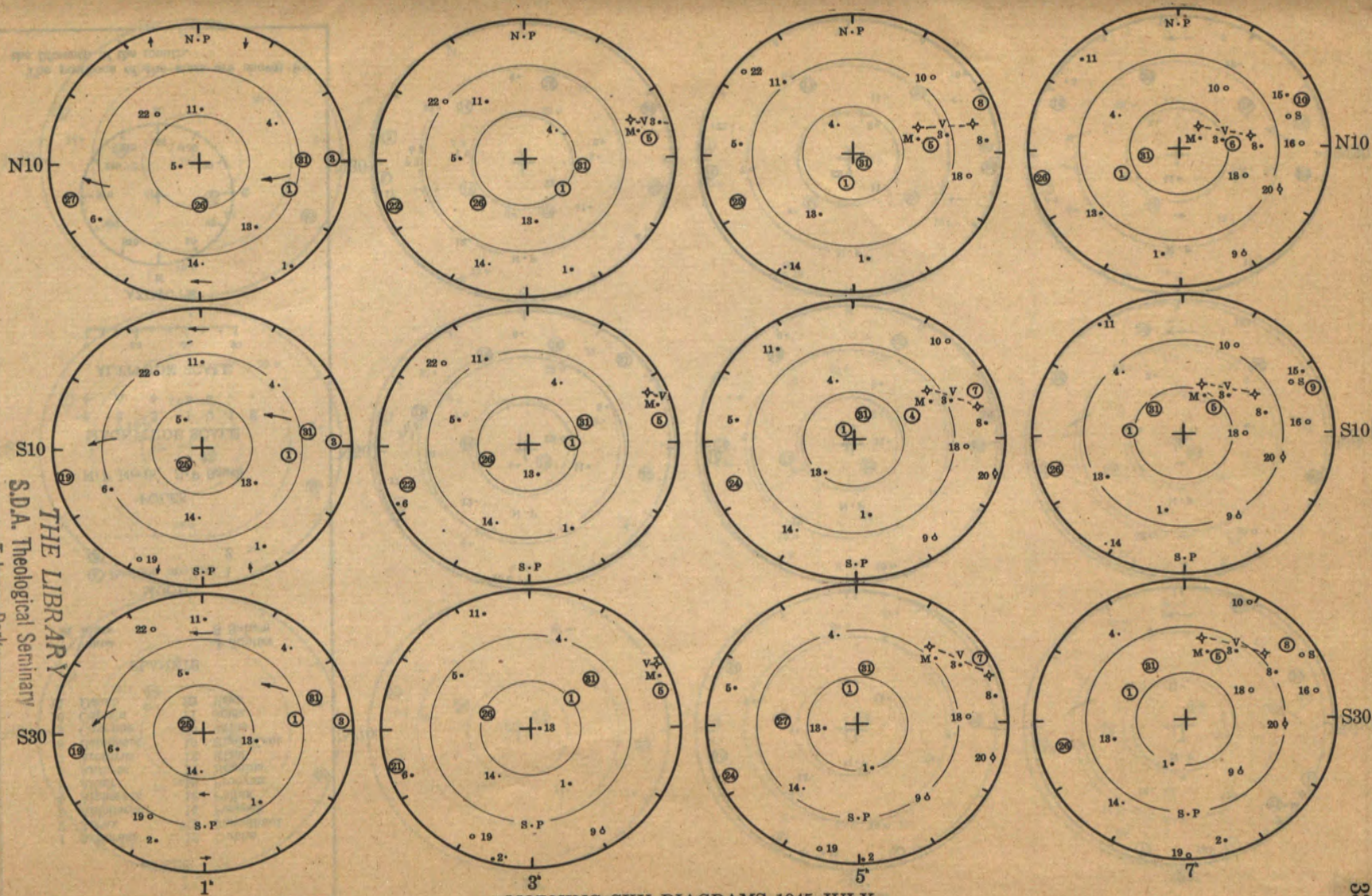
POLES  
 N.P North, S.P South

MAGNITUDE SCALE  
 -4 -3 -2 -1 0 1 2  
 + A  $\diamond$   $\delta$   $\circ$  . .

ALTITUDE SCALE  
 0 30 60 90



The positions of the stars are shown for the fifteenth of the month.





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Aug. 1  
② " " " 2

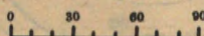
POLES

N.P North, S.P South

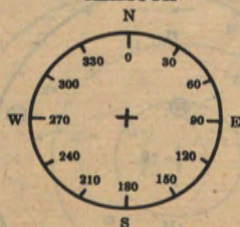
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A  $\diamond$   $\circ$  . .

ALTITUDE SCALE



AZIMUTH



The positions of the stars are shown for the fifteenth of the month.

N70

N50

N30

N70

N50

N30

N10

S10

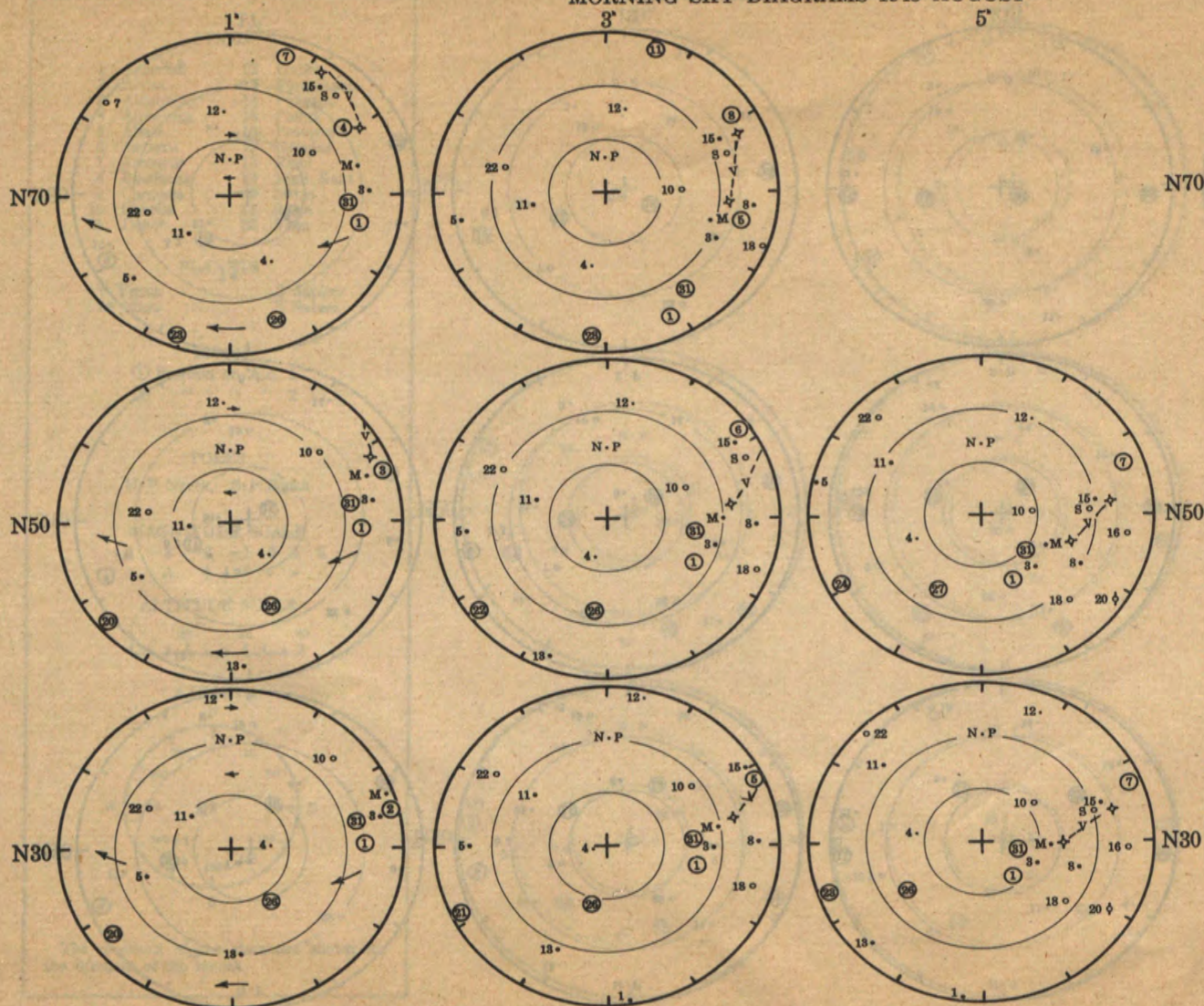
S30

N10

S10

S30





STARS

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

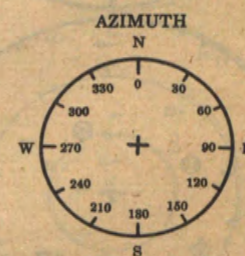
PLANETS  
 V Venus J Jupiter  
 M Mars S Saturn

MOON  
 ① Position on Aug. 1  
 ② " " " 2

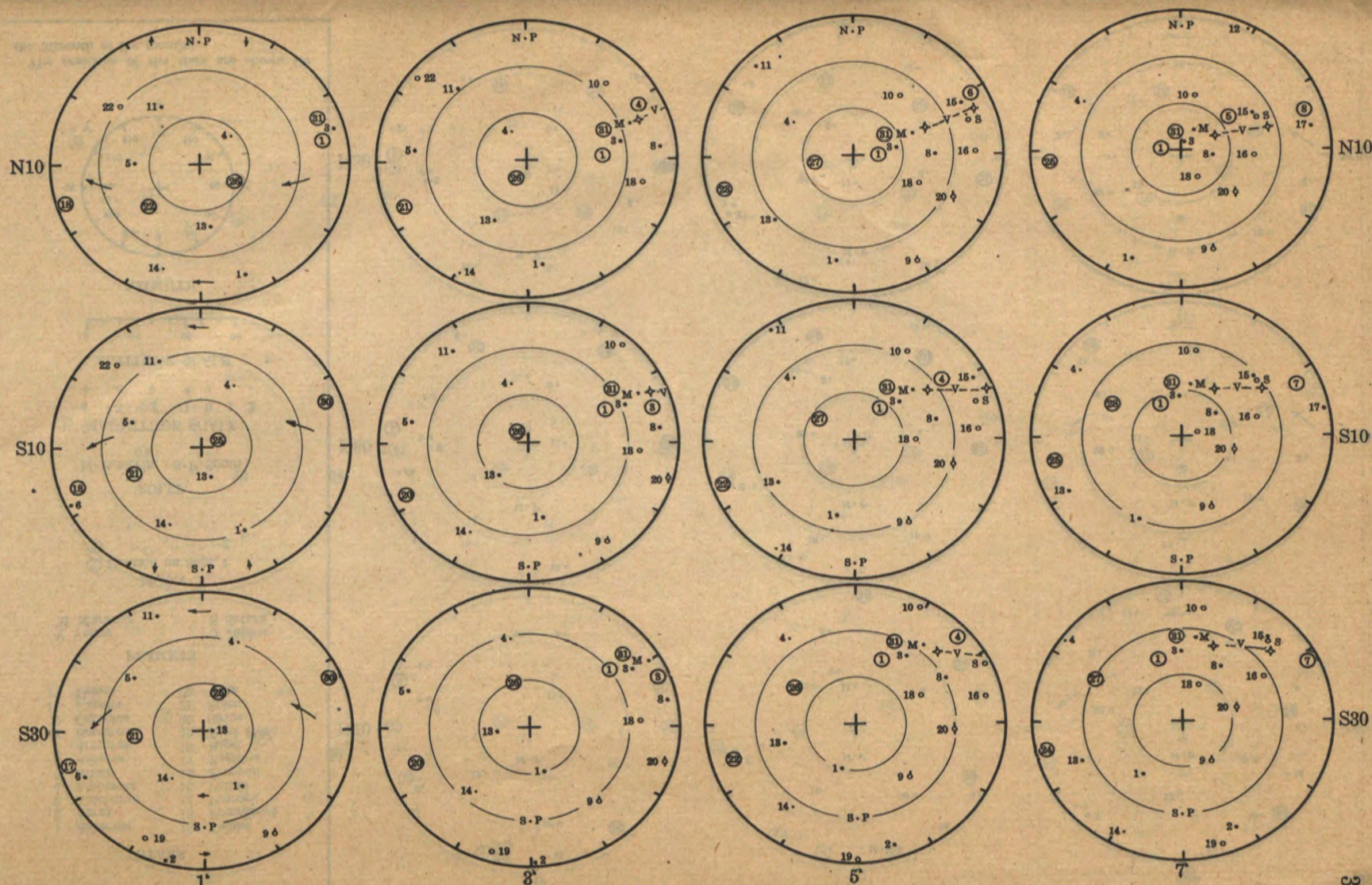
POLES  
 N.P North, S.P South

MAGNITUDE SCALE  
 -4 -3 -2 -1 0 1 2  
 ♦ A ♦ δ o . .

ALTITUDE SCALE  
 0 30 60 90



The positions of the stars are shown for the fifteenth of the month.





STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Sept. 1  
② " " " 2

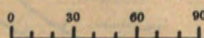
POLES

N.P North, S.P South

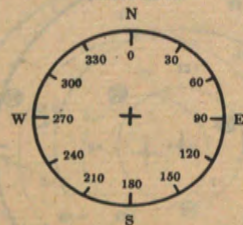
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
♦ A ♦ ♦ ♦ ♦ ♦

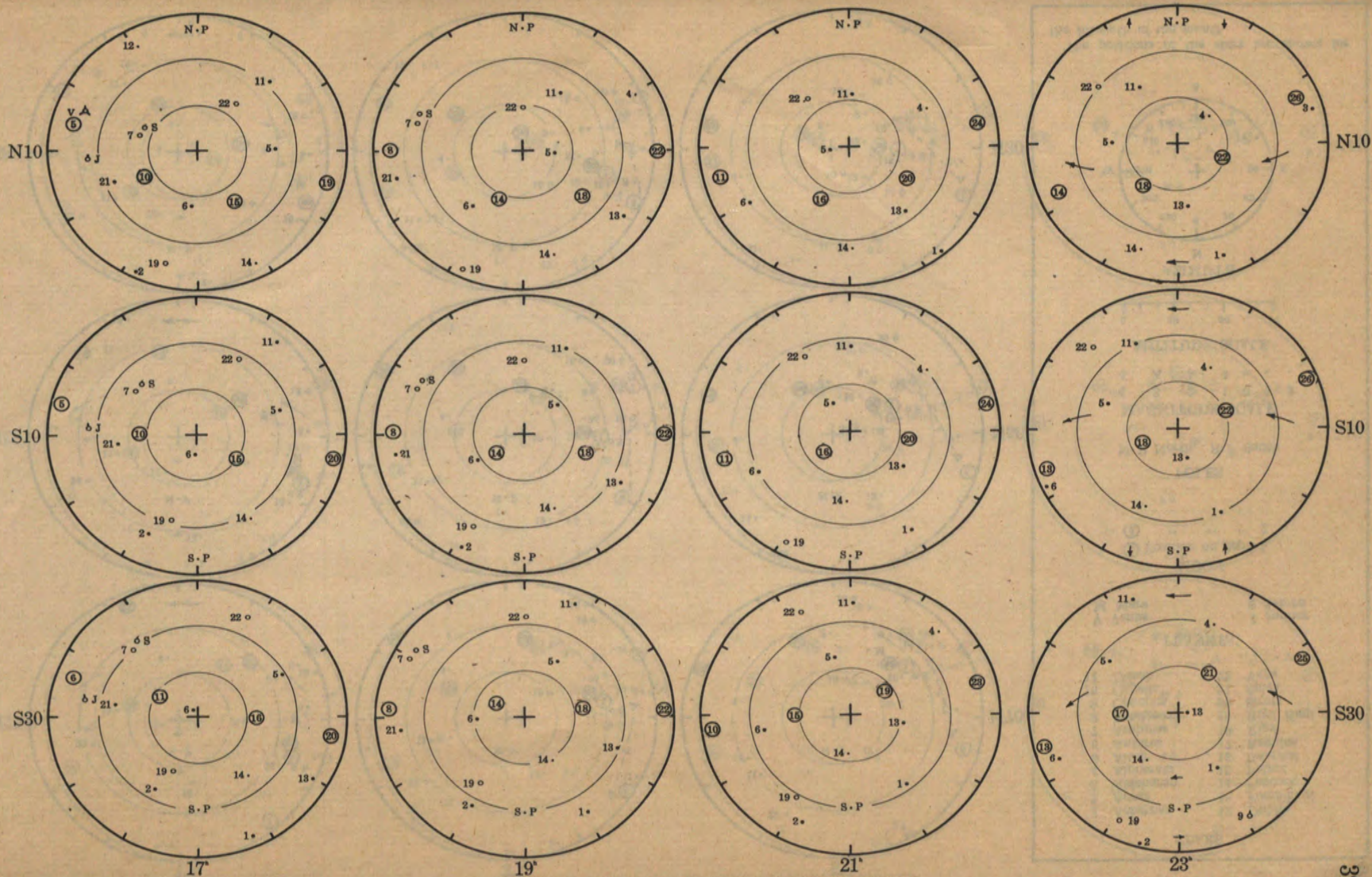
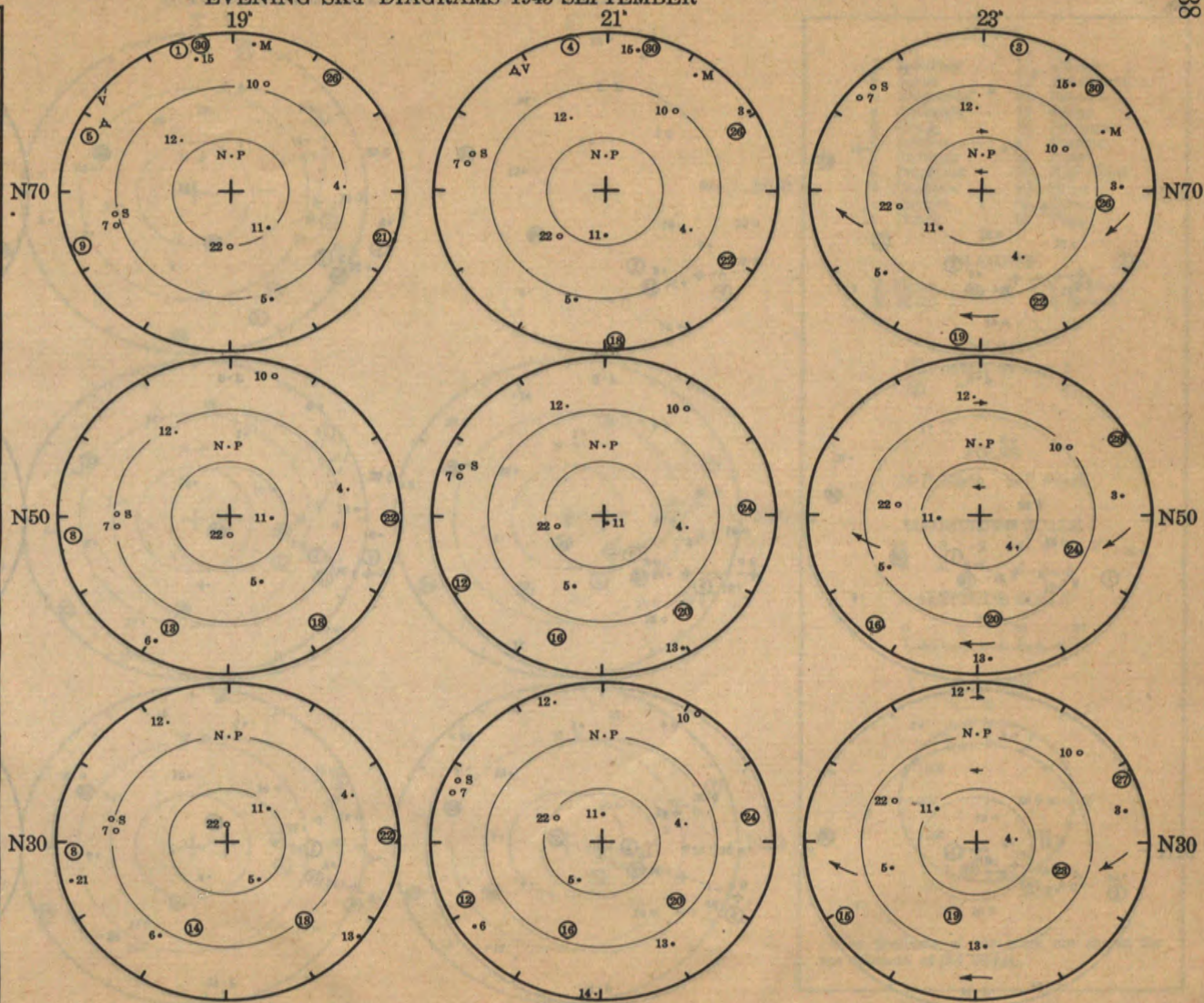
ALTITUDE SCALE



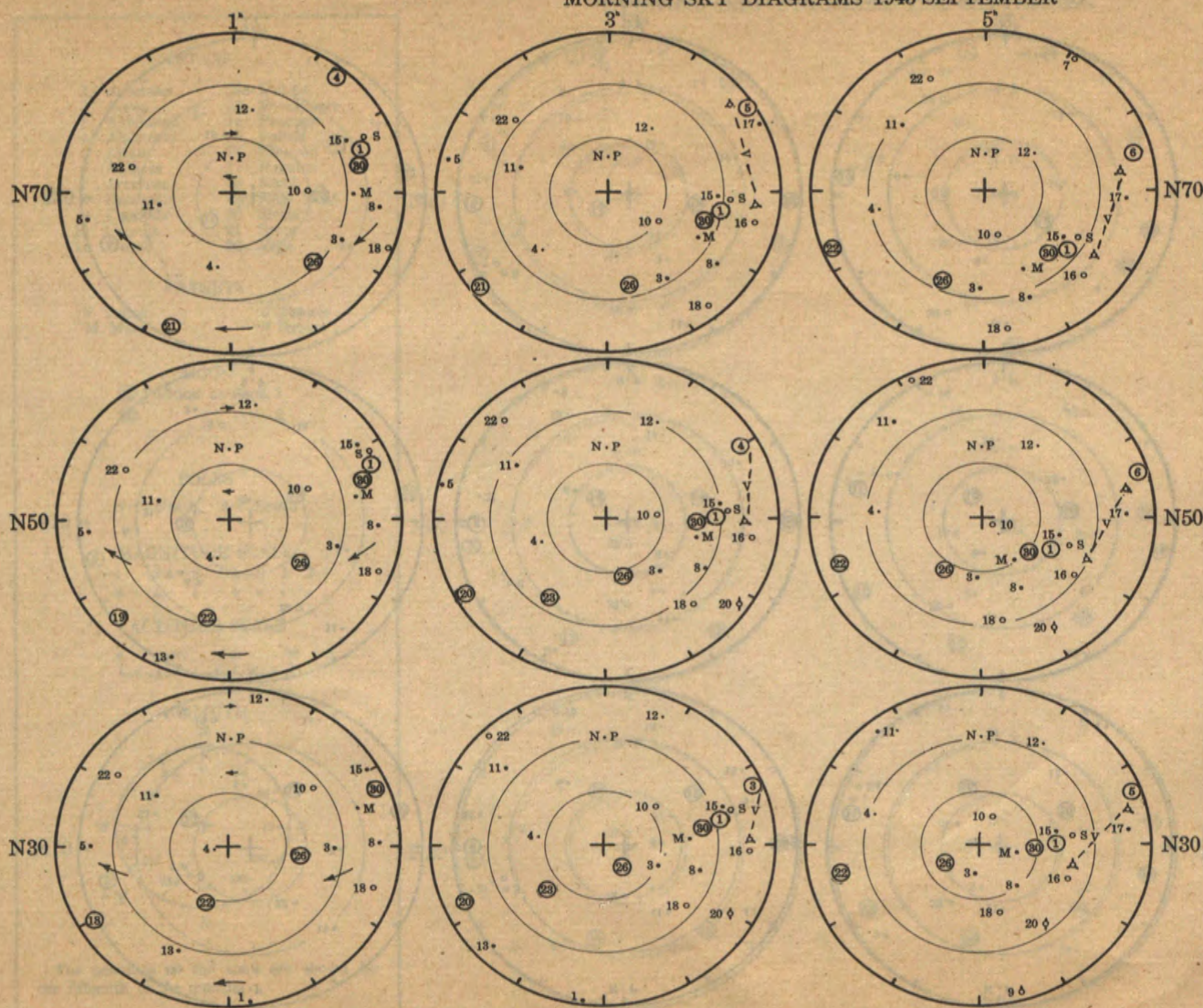
AZIMUTH



The positions of the stars are shown for the fifteenth of the month.







**STARS**

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

**PLANETS**

V Venus                      J Jupiter  
M Mars                      S Saturn

**MOON**

① Position on Sept. 1  
② " " 2

**POLES**

N.P. North, S.P. South

**MAGNITUDE SCALE**

-4 -3 -2 -1 0 1 2  
+ A φ δ ° . .

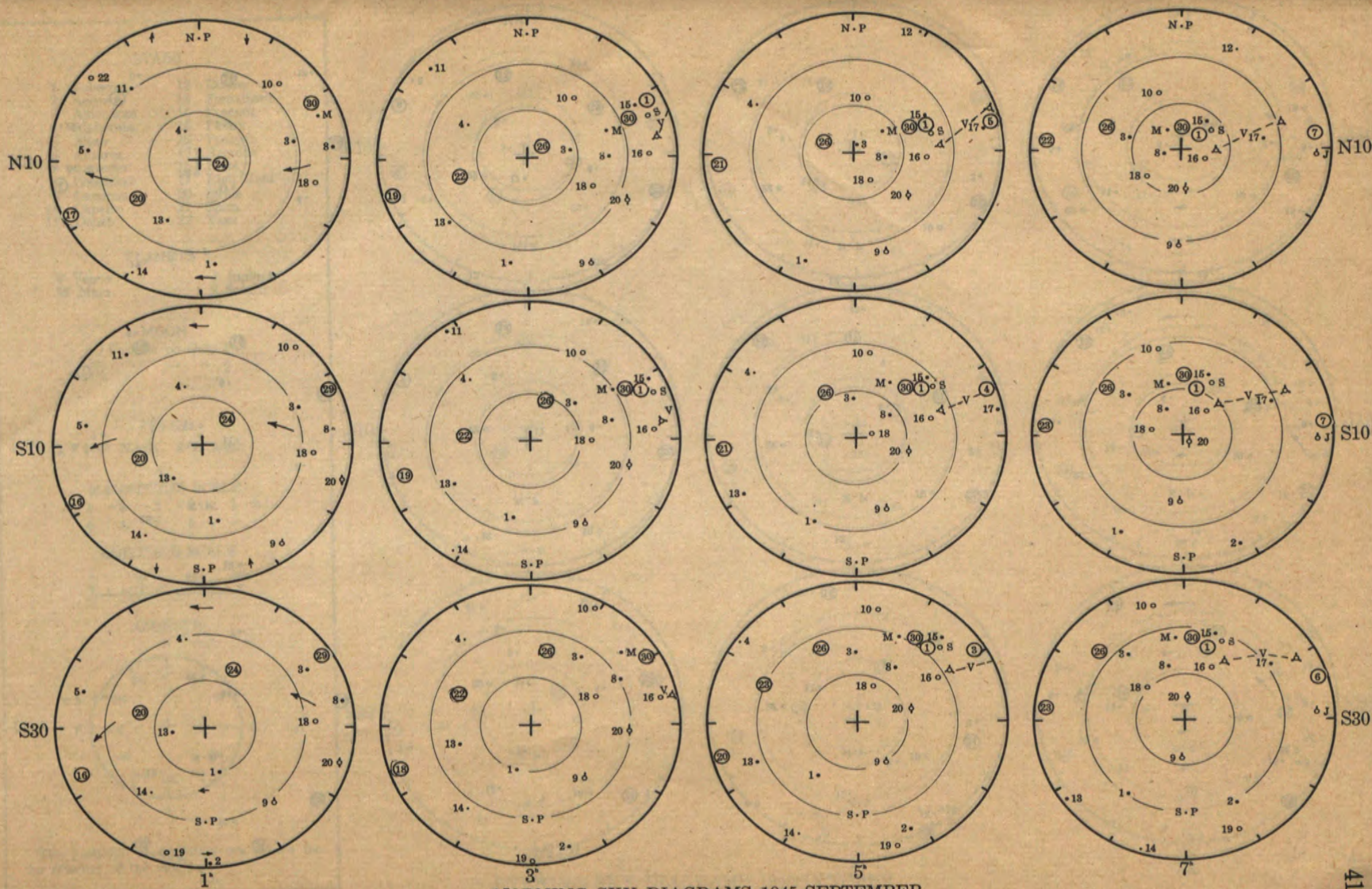
**ALTITUDE SCALE**

0 30 60 90

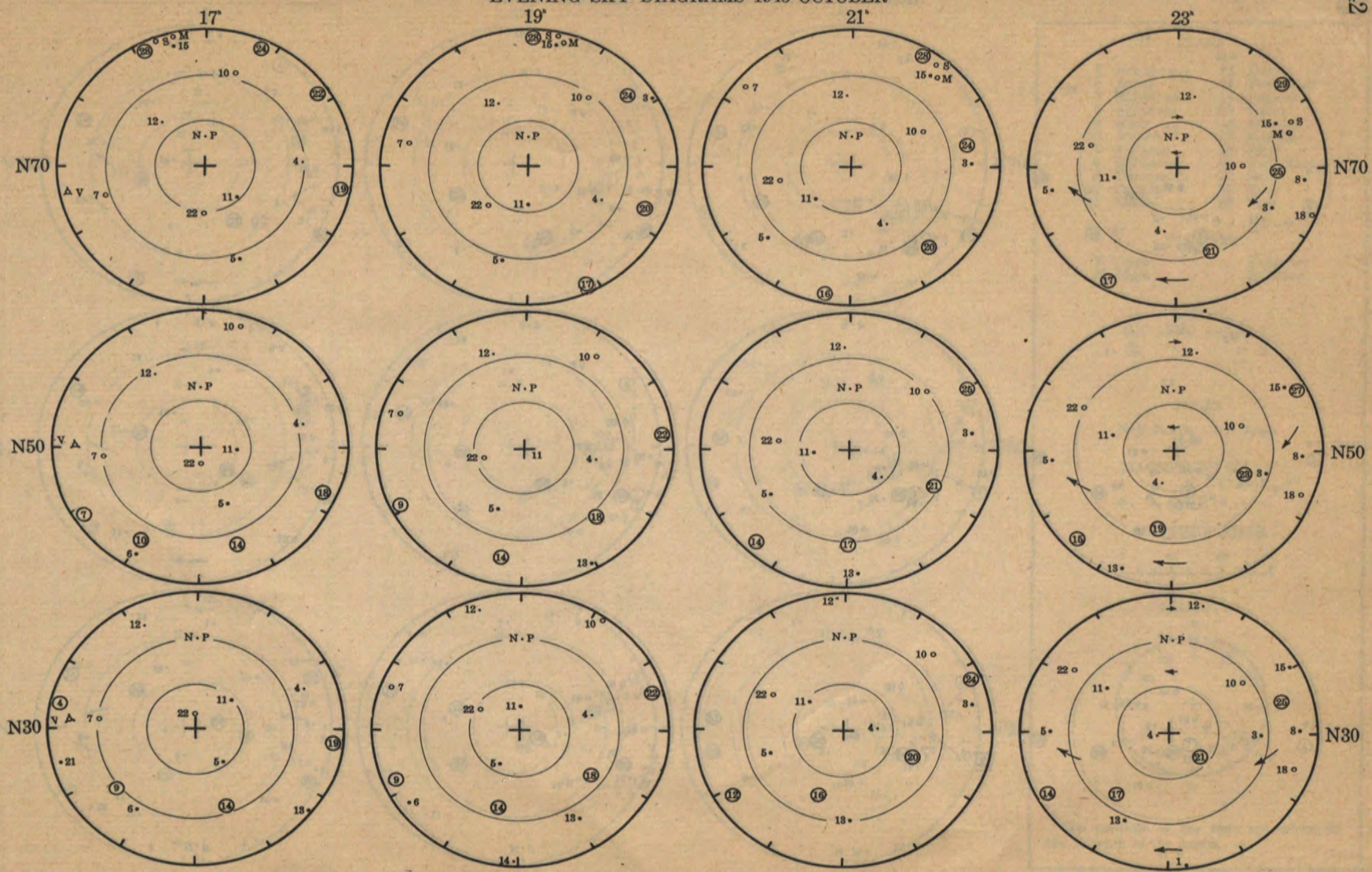
**AZIMUTH**

N  
330 0 30 60  
300 90  
270 120  
240 150  
210 180  
S

The positions of the stars are shown for the fifteenth of the month.







STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus      J Jupiter  
M Mars      S Saturn

MOON

- ① Position on Oct. 1  
② " " " 2

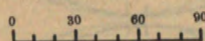
POLES

N.P. North, S.P. South

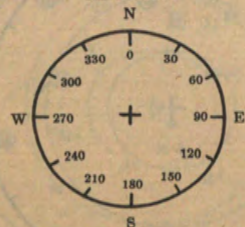
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
♦ A ♦ ○ ○ ○

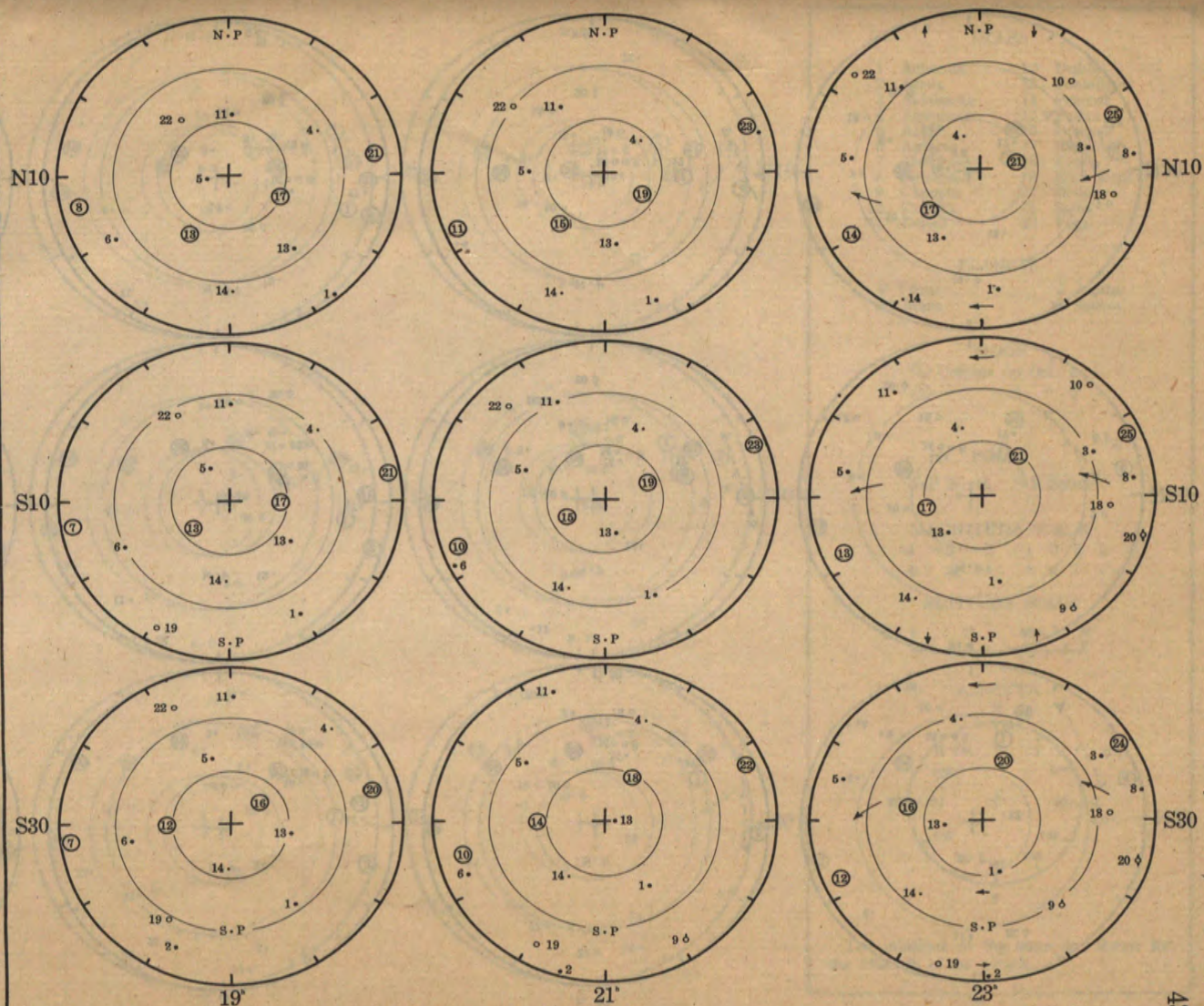
ALTITUDE SCALE



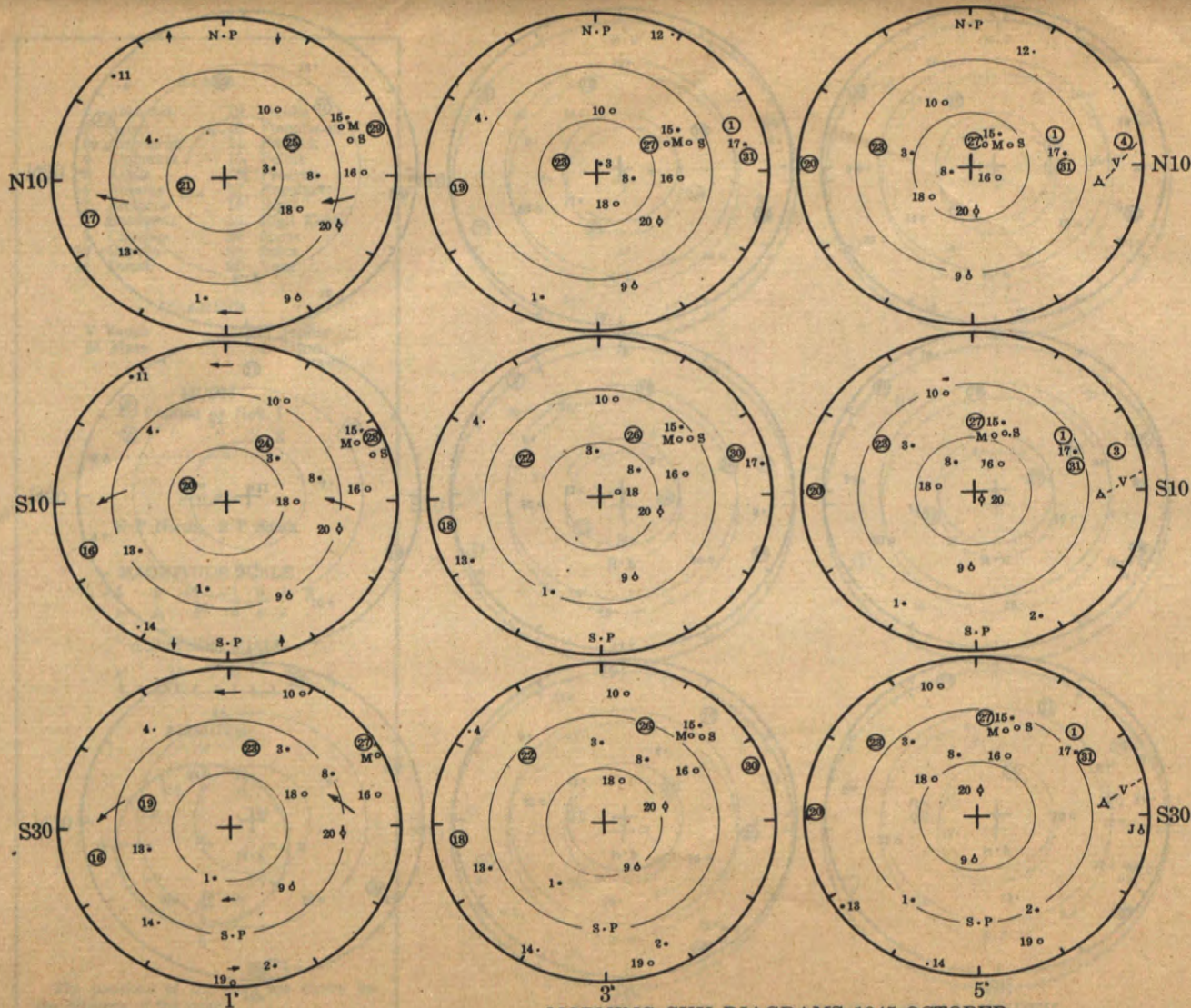
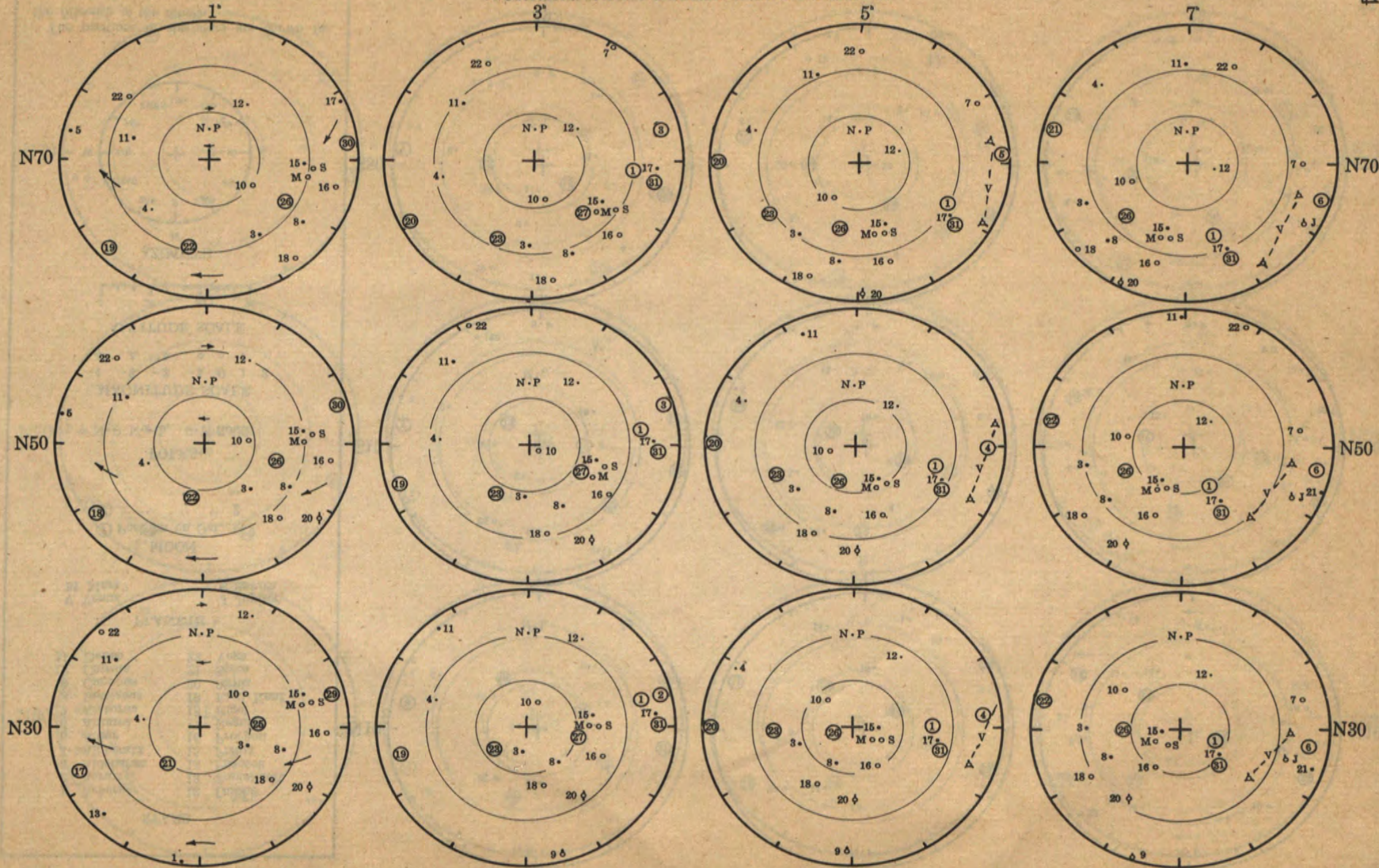
AZIMUTH



The positions of the stars are shown for the fifteenth of the month.







**STARS**

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

**PLANETS**

V Venus      J Jupiter  
M Mars      S Saturn

**MOON**

① Position on Oct. 1  
② " " " 2

**POLES**

N·P North, S·P South

**MAGNITUDE SCALE**

-4 -3 -2 -1 0 1 2  
+ A φ δ o .

**ALTITUDE SCALE**

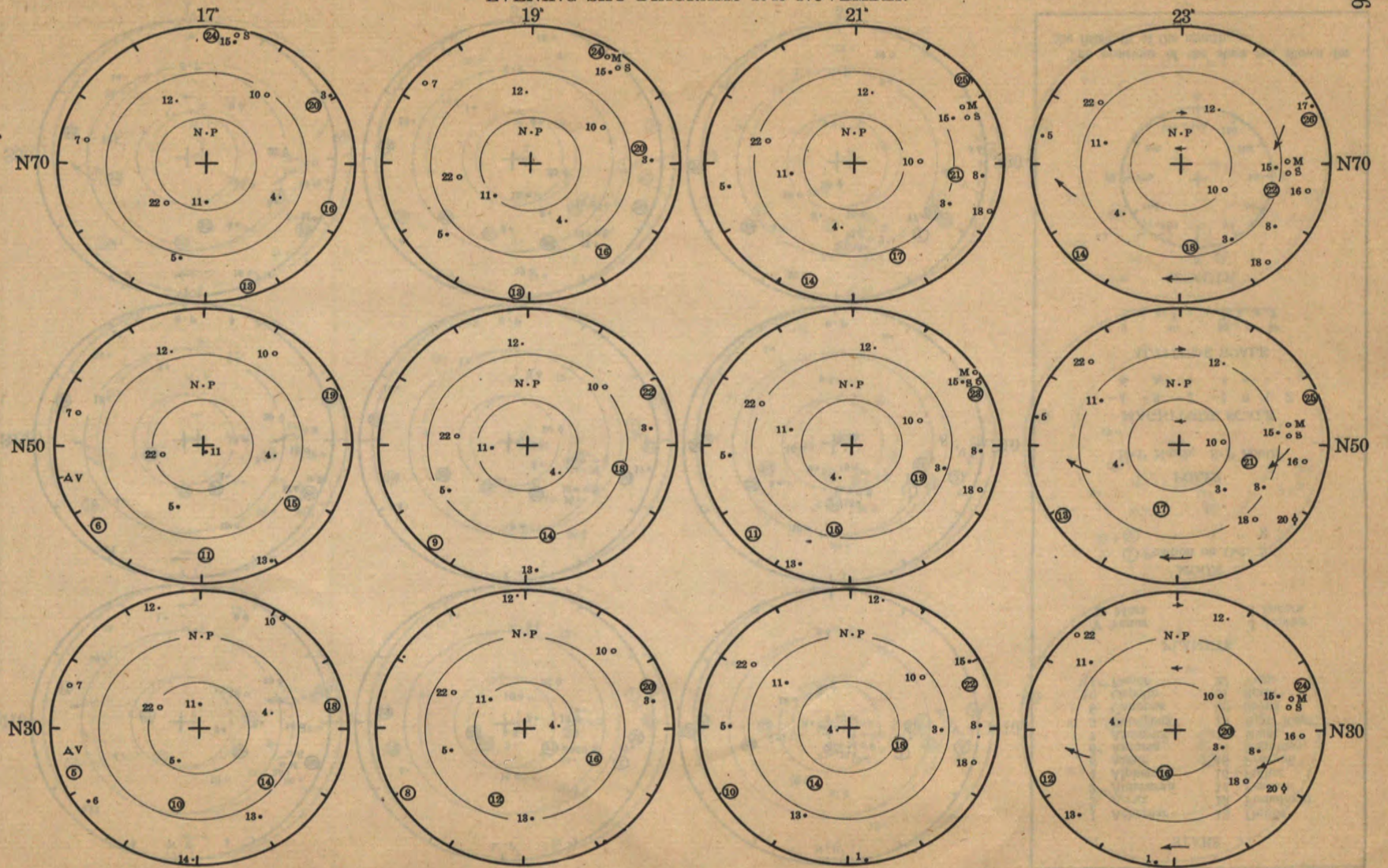
0 30 60 90

**AZIMUTH**

N  
330 0 30  
300 60  
270 90 E  
240 120  
210 150  
180 180 S

The positions of the stars are shown for the fifteenth of the month.





STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Nov. 1  
② " " " 2

POLES

N-P North, S-P South

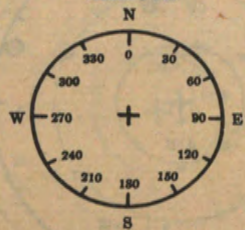
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
+ A φ δ ○ . .

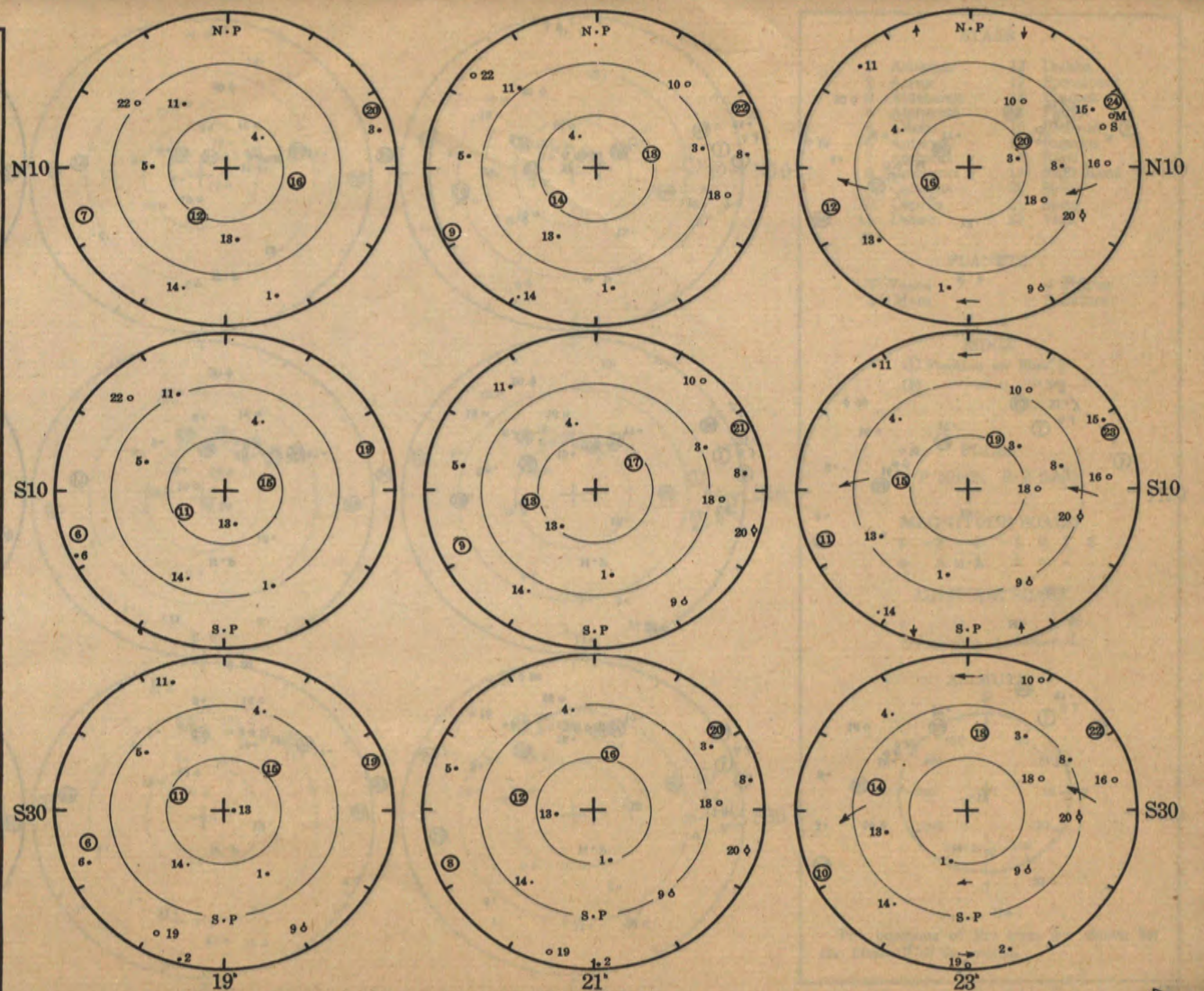
ALTITUDE SCALE



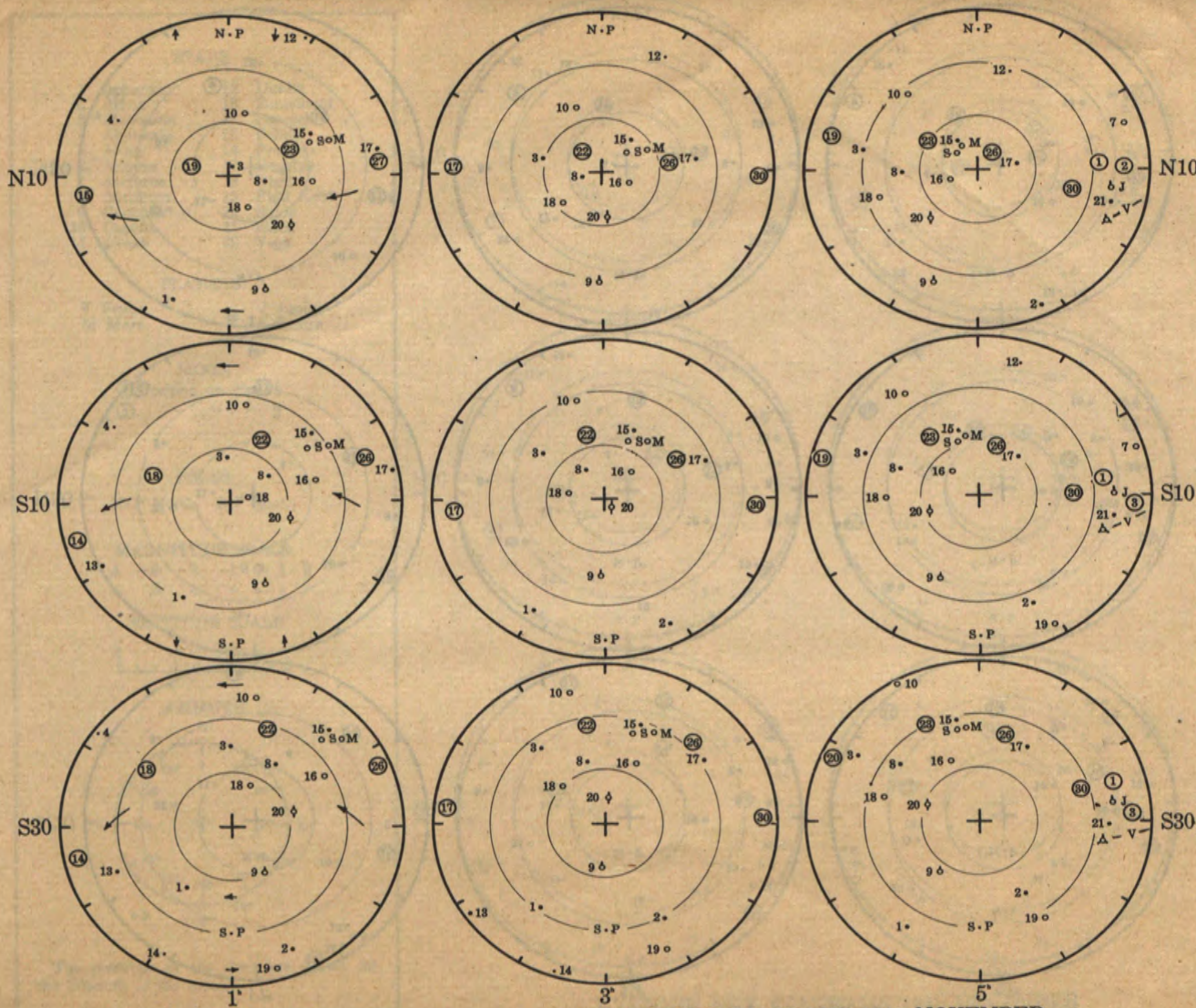
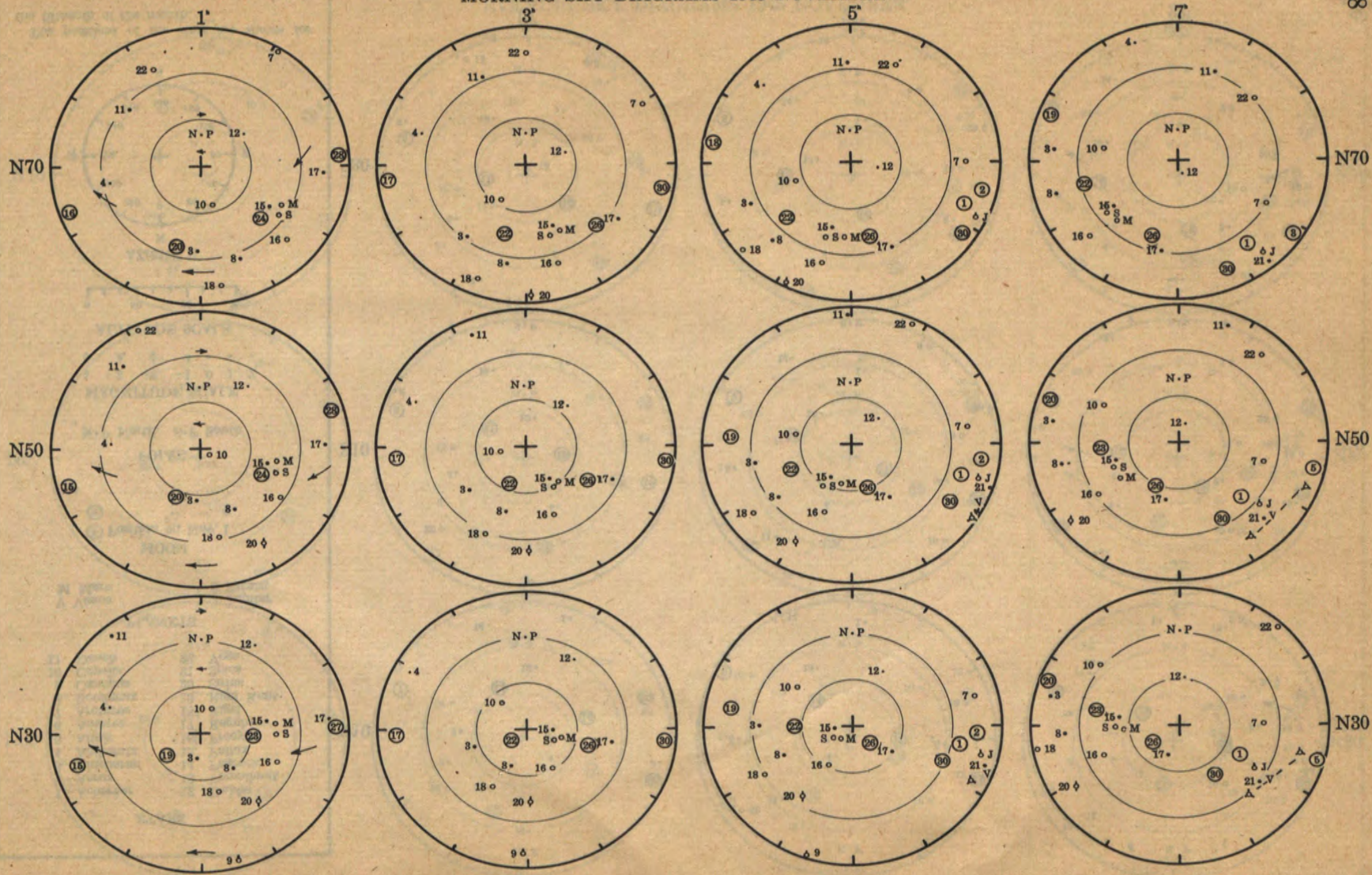
AZIMUTH



The positions of the stars are shown for the fifteenth of the month.







**STARS**

|             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

**PLANETS**

V Venus                      J Jupiter  
M Mars                      S Saturn

**MOON**  
① Position on Nov. 1  
② " " " 2

**POLES**  
N.P North, S.P South

**MAGNITUDE SCALE**  
-4 -3 -2 -1 0 1 2  
+ A + + + +

**ALTITUDE SCALE**  
0 30 60 90

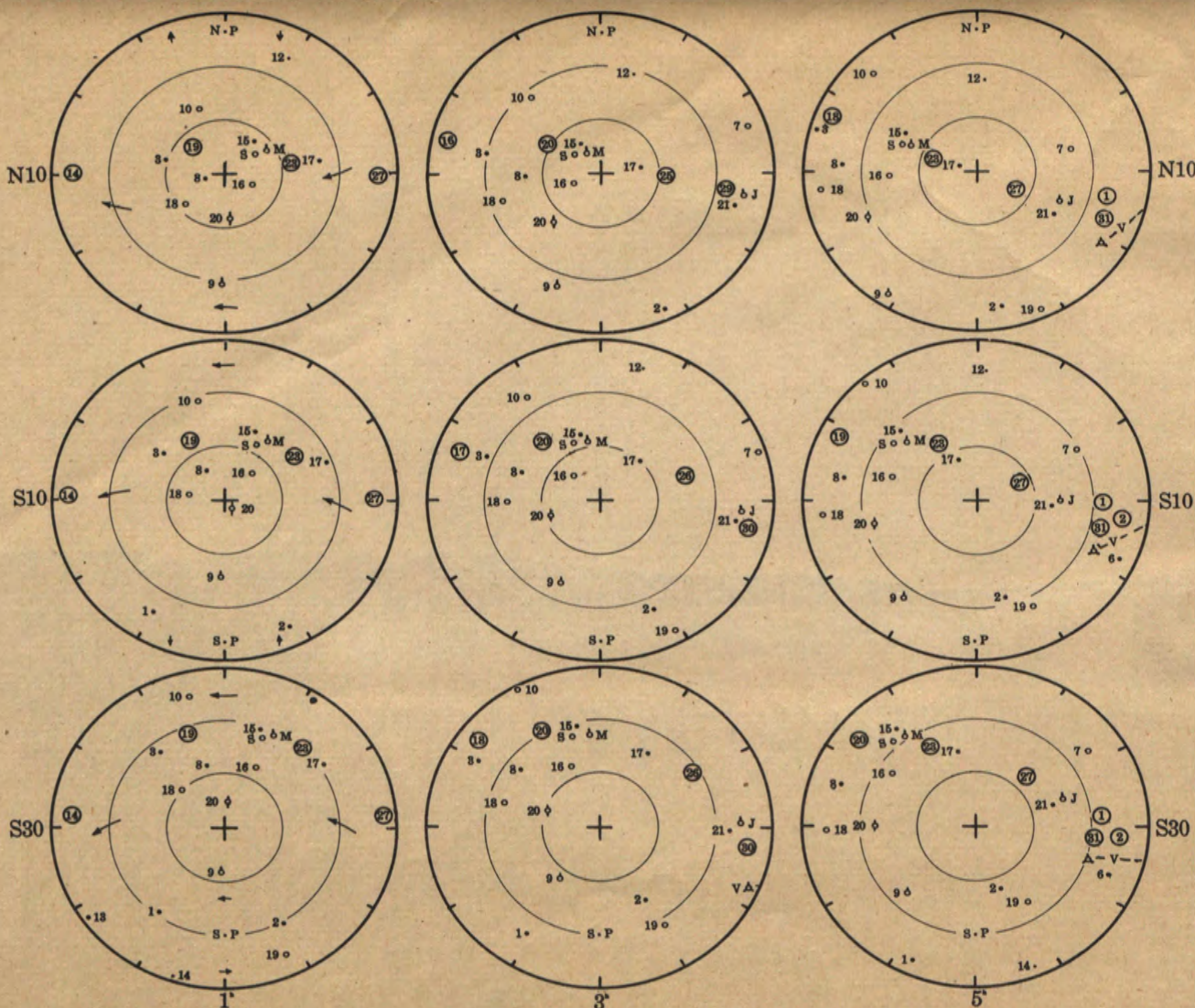
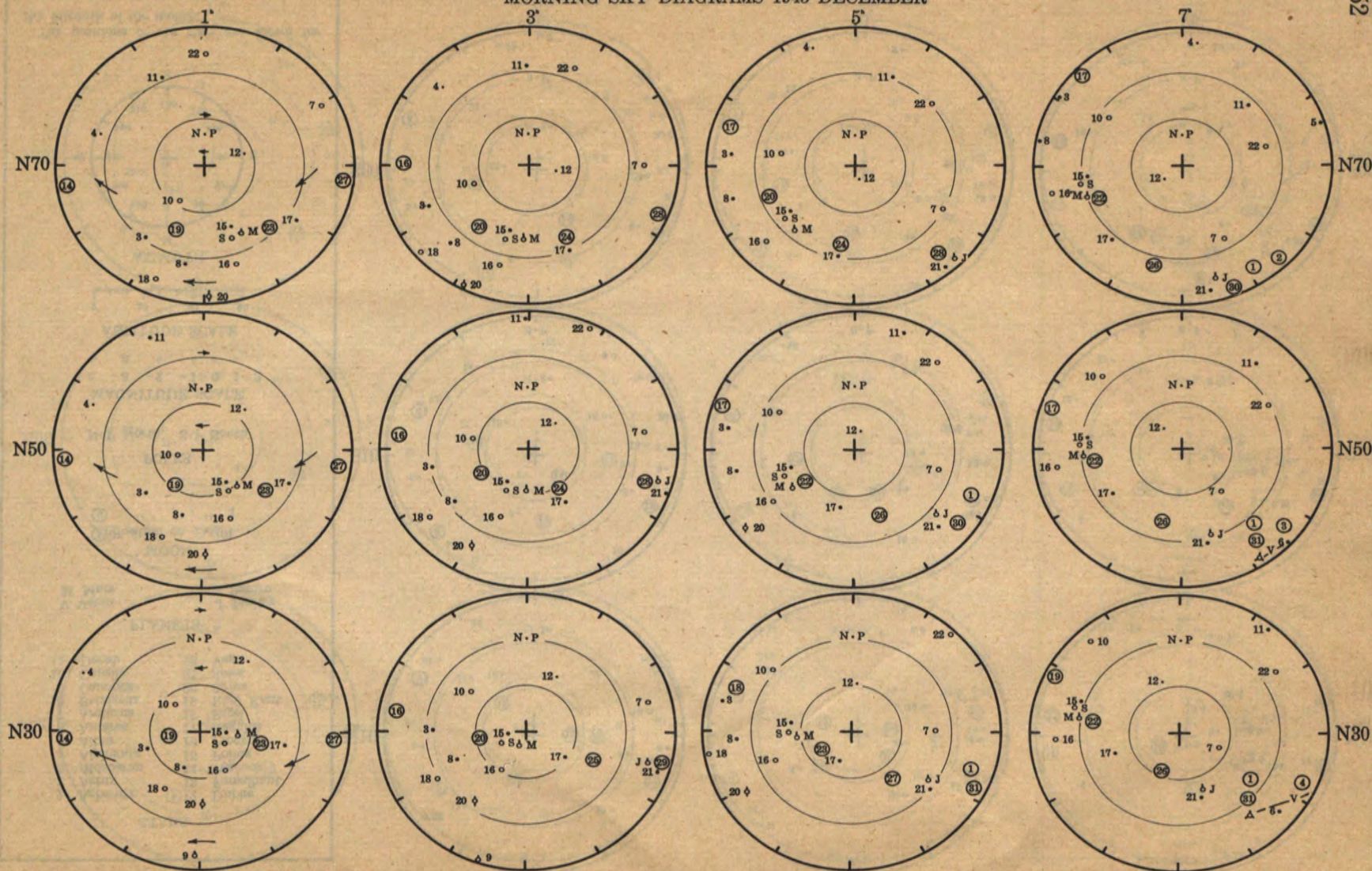
**AZIMUTH**  
N  
330 0 30  
270 90  
210 180  
150 60  
S

The positions of the stars are shown for the fifteenth of the month.









STARS

- |             |               |
|-------------|---------------|
| 1 Achernar  | 12 Dubhe      |
| 2 Acrux     | 13 Fomalhaut  |
| 3 Aldebaran | 14 Peacock    |
| 4 Alpheratz | 15 Pollux     |
| 5 Altair    | 16 Procyon    |
| 6 Antares   | 17 Regulus    |
| 7 Arcturus  | 18 Rigel      |
| 8 Betelgeux | 19 Rigel Kent |
| 9 Canopus   | 20 Sirius     |
| 10 Capella  | 21 Spica      |
| 11 Deneb    | 22 Vega       |

PLANETS

V Venus J Jupiter  
M Mars S Saturn

MOON

- ① Position on Dec. 1  
② " " " 2

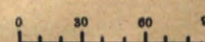
POLES

N·P North, S·P South

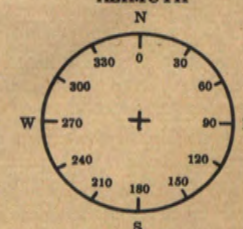
MAGNITUDE SCALE

-4 -3 -2 -1 0 1 2  
♦ A ♦ ♦ ♦ ♦

ALTITUDE SCALE



AZIMUTH



The positions of the stars are shown for the fifteenth of the month.



